

Figure 1

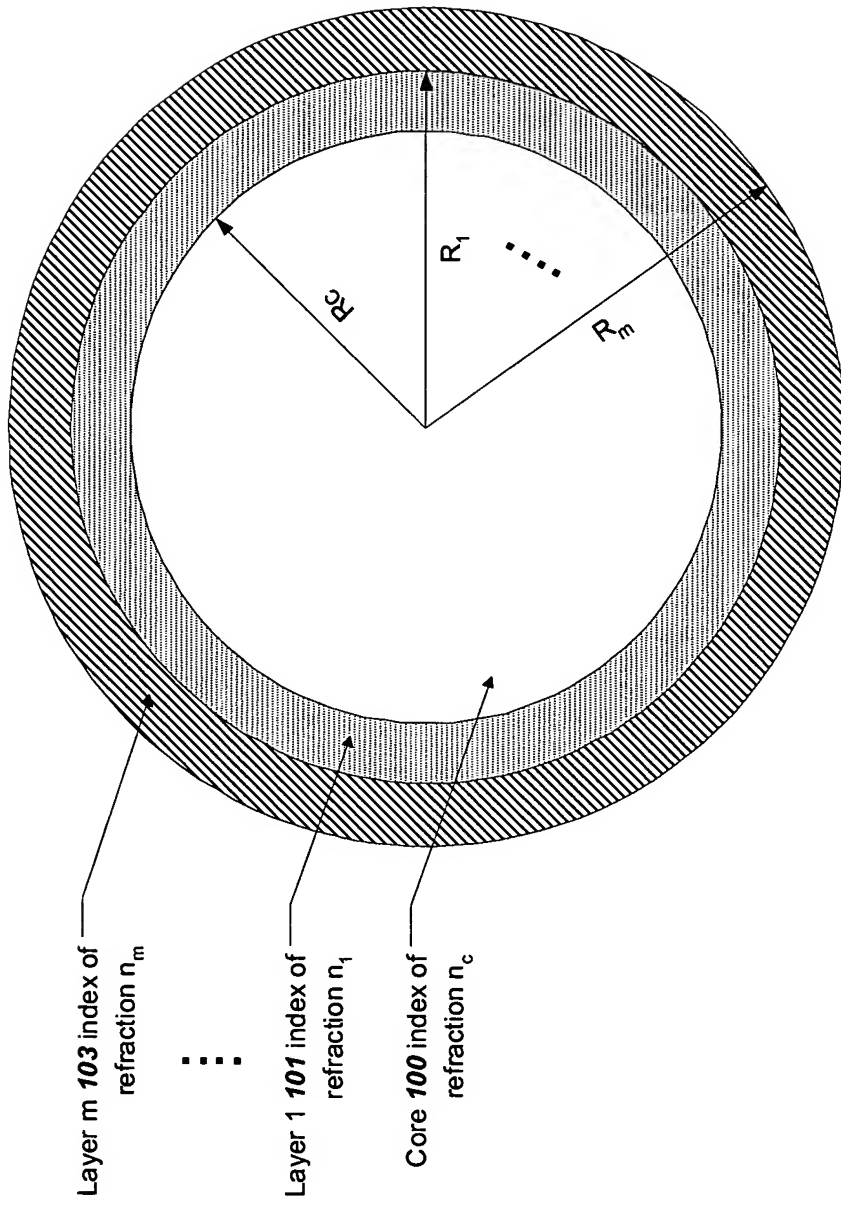


Figure 2

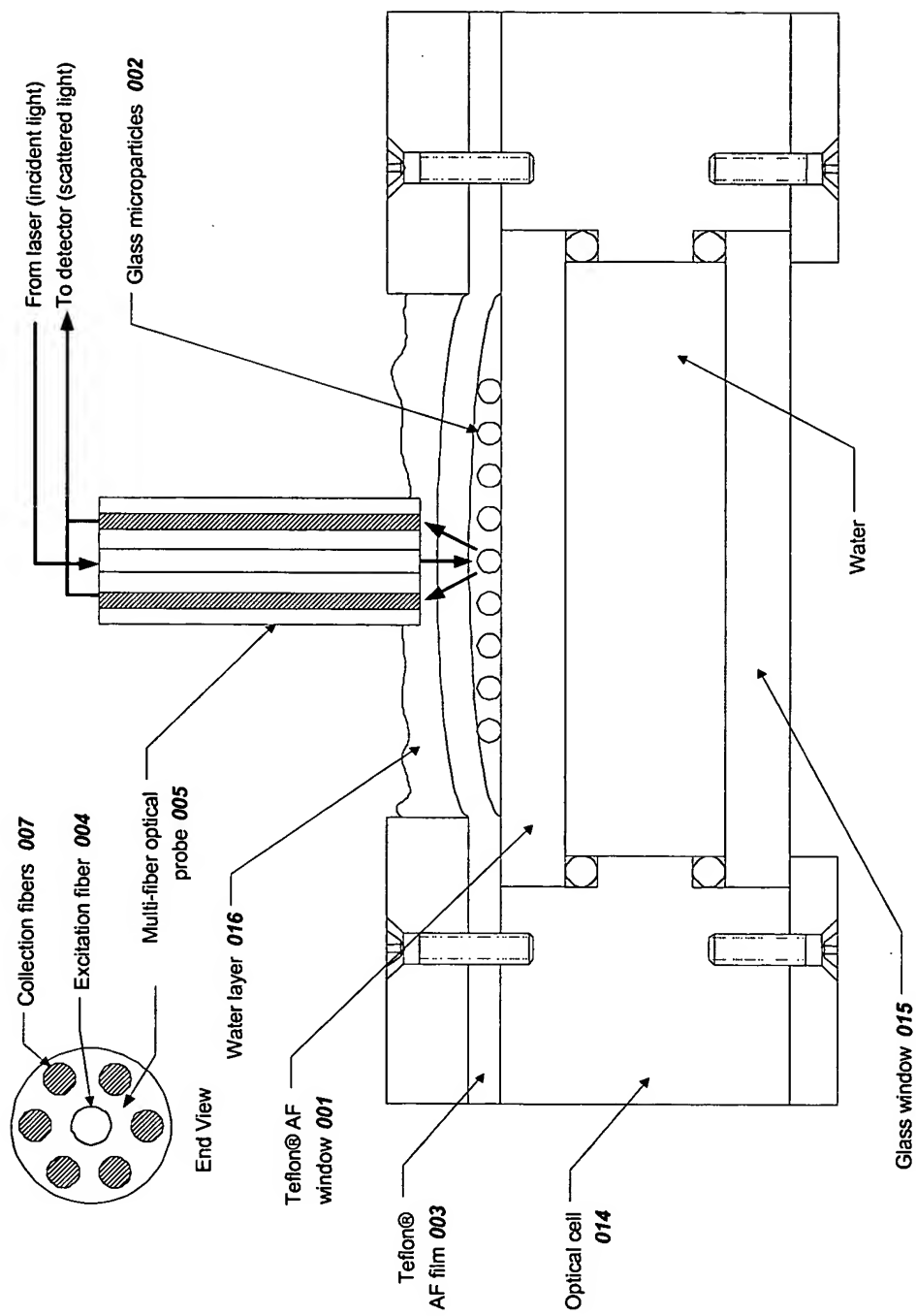


Figure 3

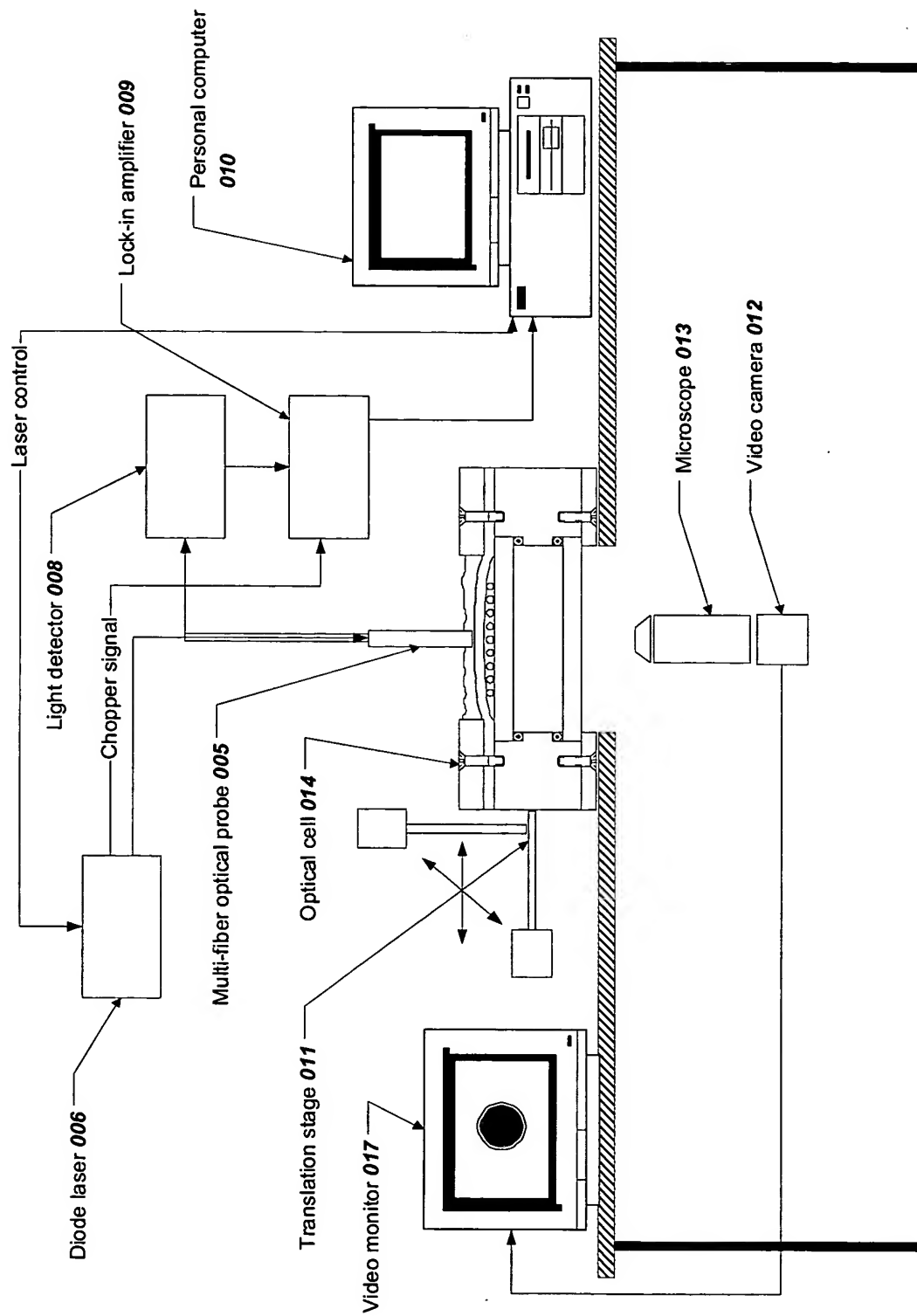


Figure 4

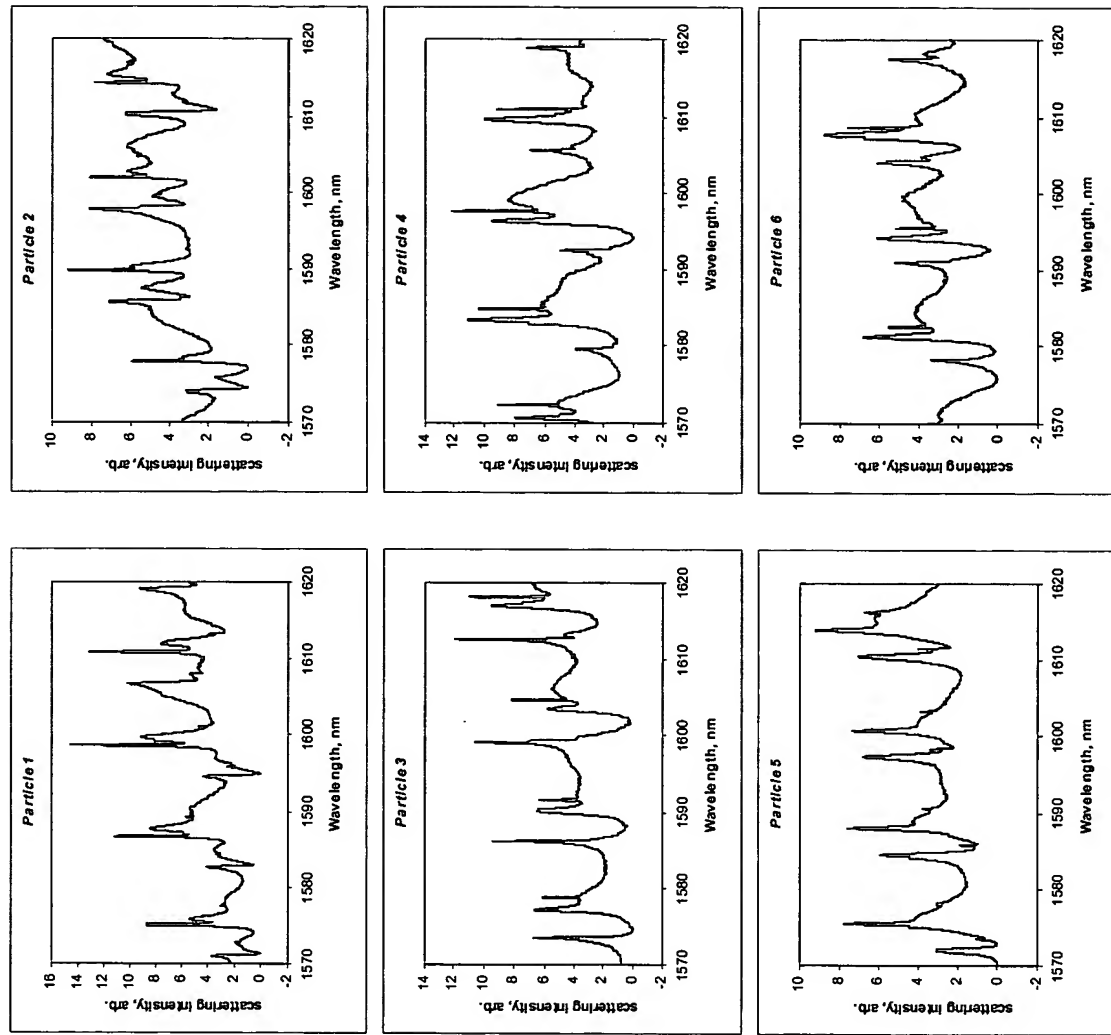


Figure 5

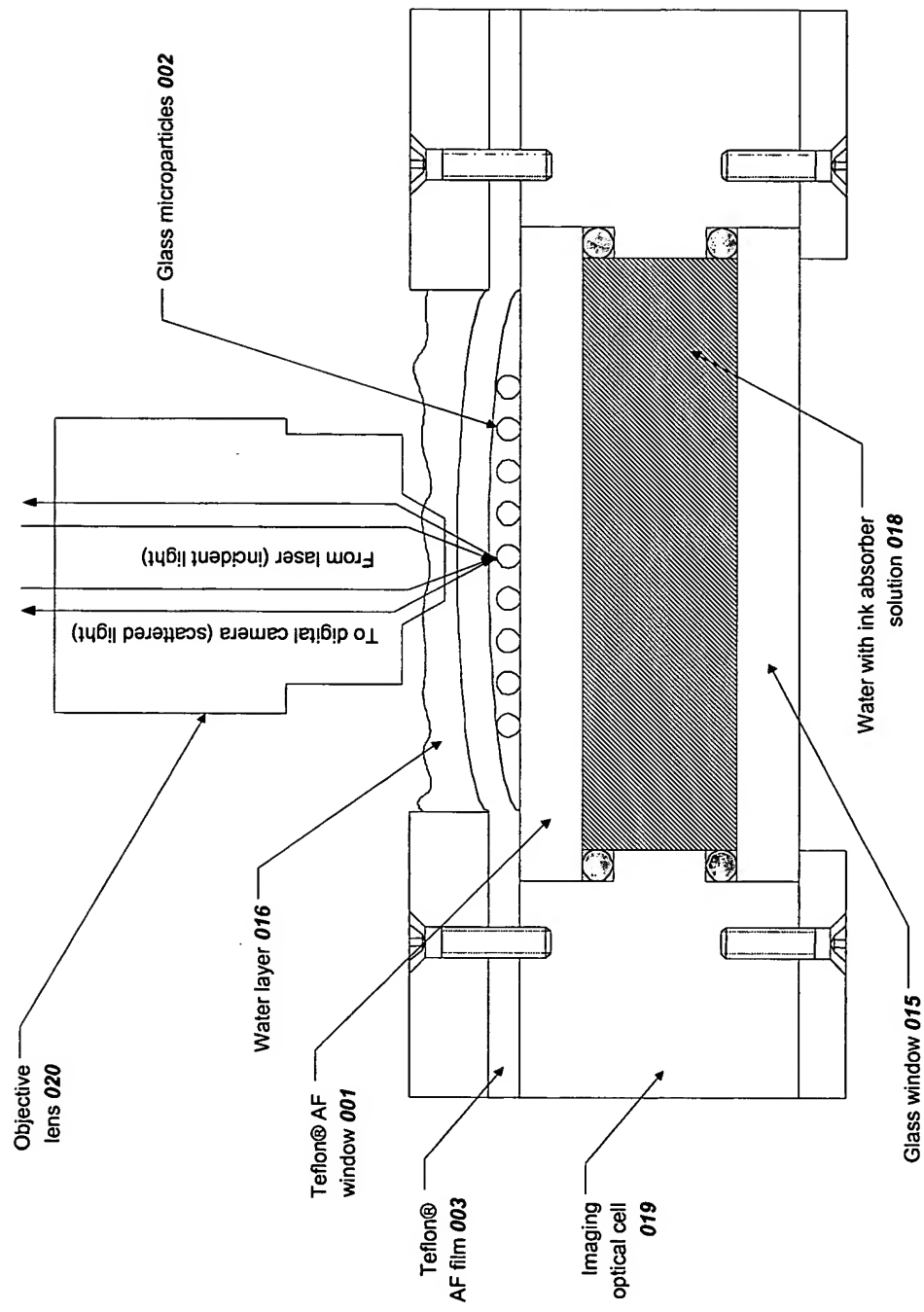


Figure 6

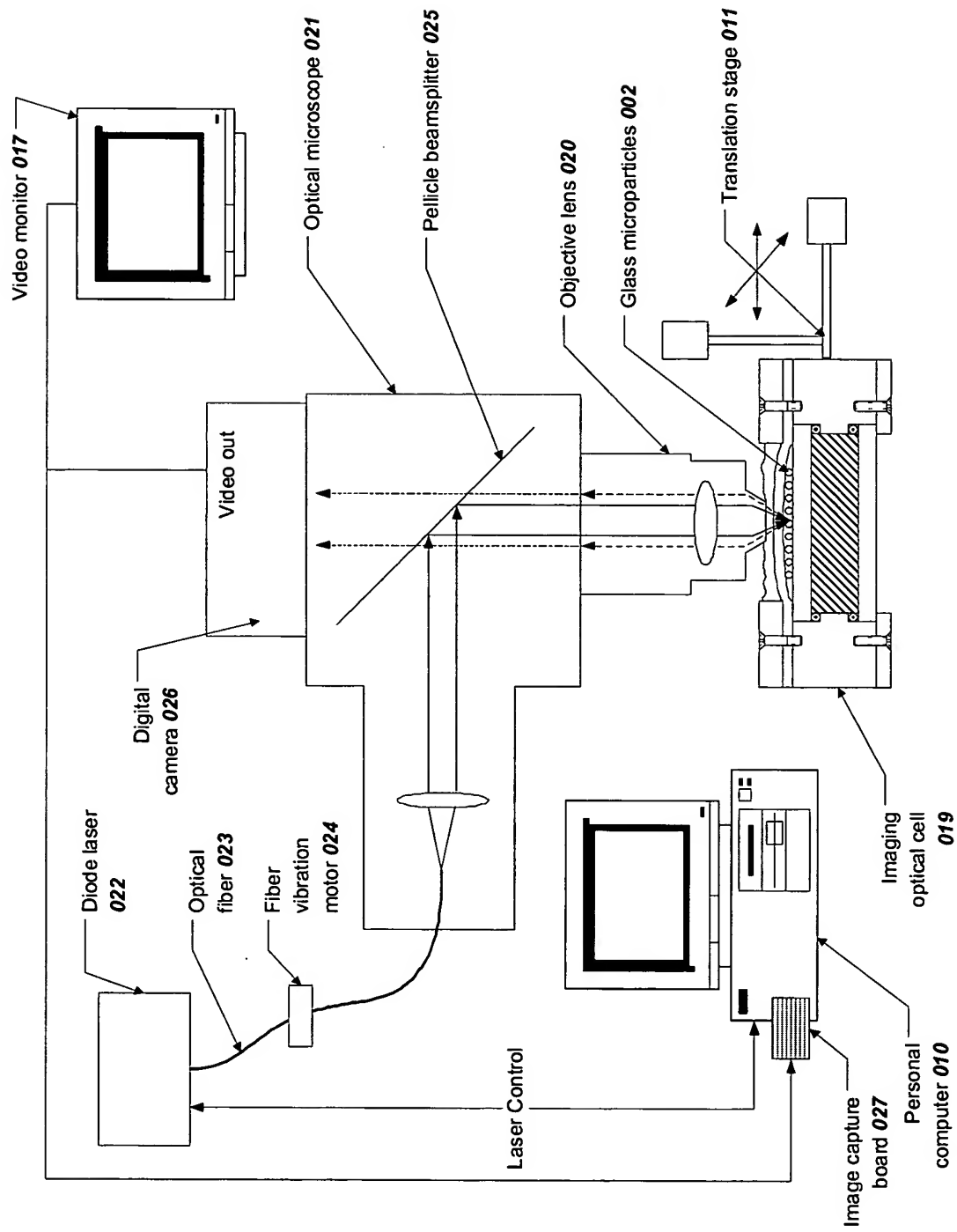
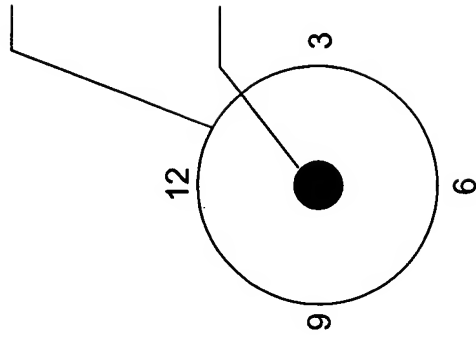


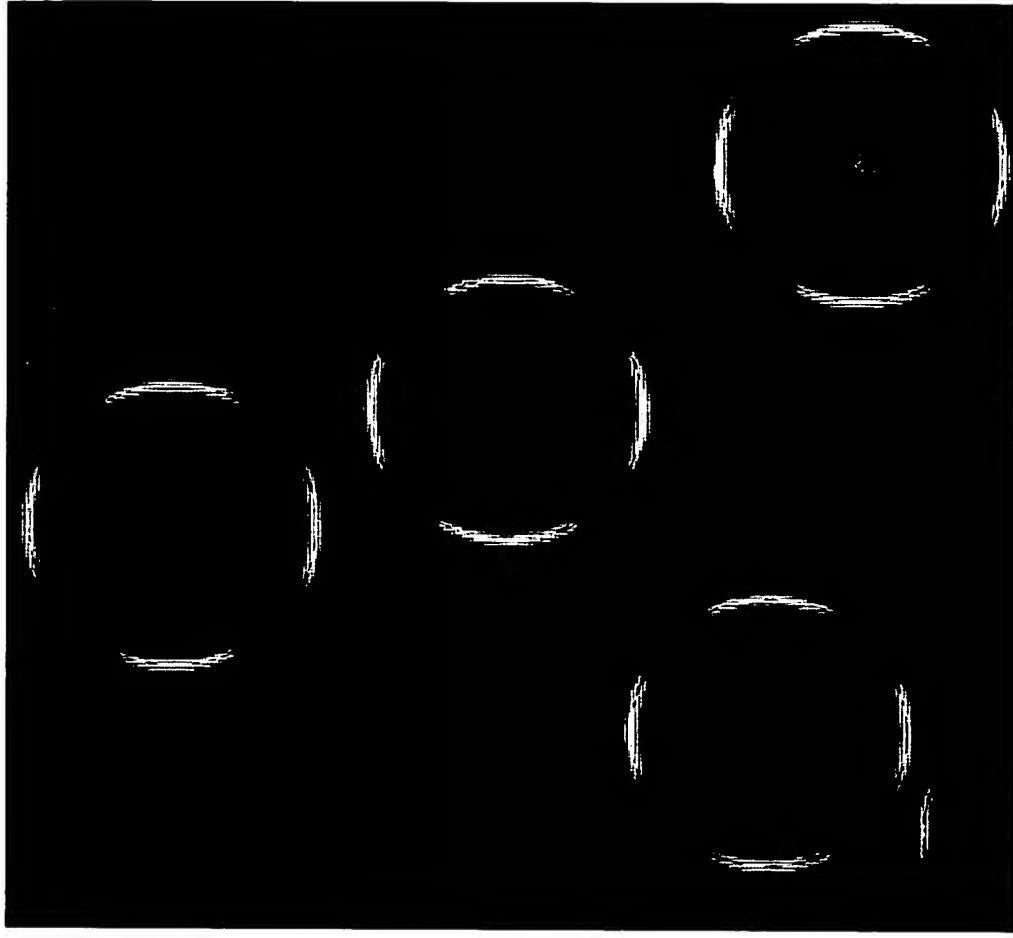
Figure 7

Image of  
scattered  
light **106**

Image of  
reflected  
light **107**



Legend showing  
polarization regions and  
sources of scattered and  
reflected light



~ 35 micrometers

Figure 8



Scattered  
light spectra  
150

Image for  
wavelength  
L<sub>n</sub> 105

Image for  
wavelength  
L<sub>2</sub> 104

Image for  
wavelength  
L<sub>2</sub> 103

Image for  
wavelength L<sub>1</sub>  
102

Pixels of interest  
(12 and 3  
polarizations)  
101

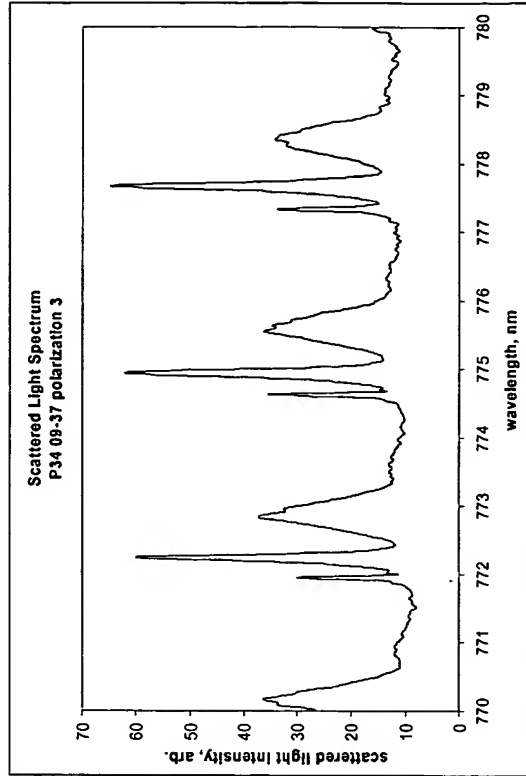
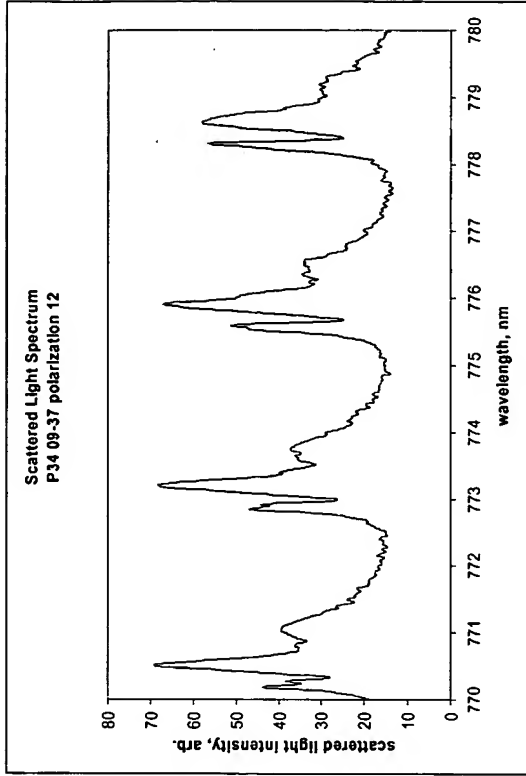
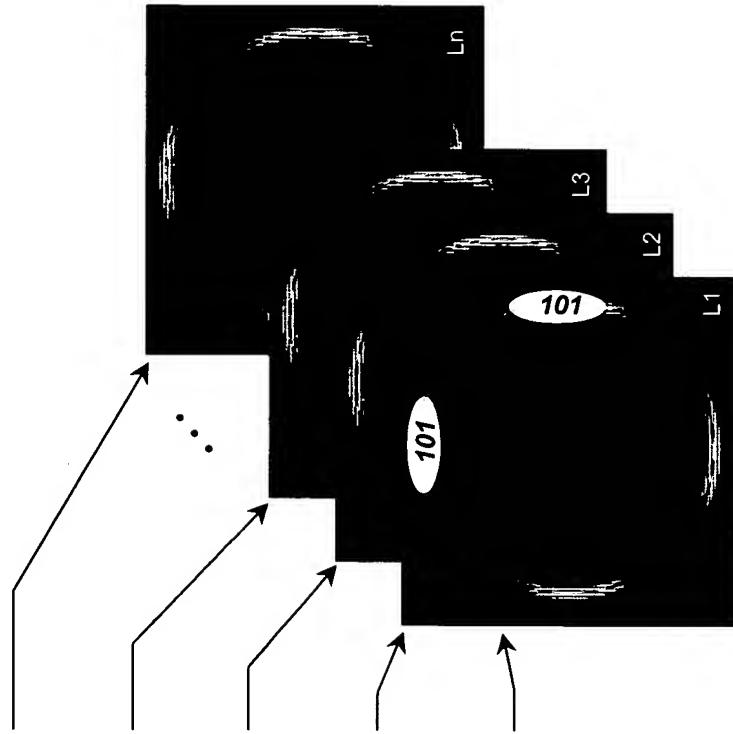


Figure 9

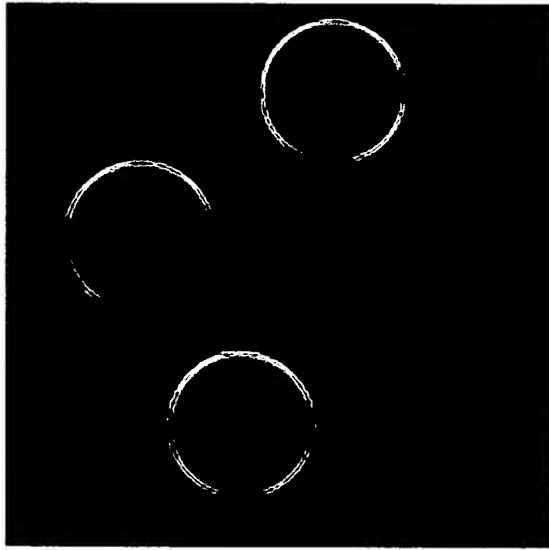


Figure 10A

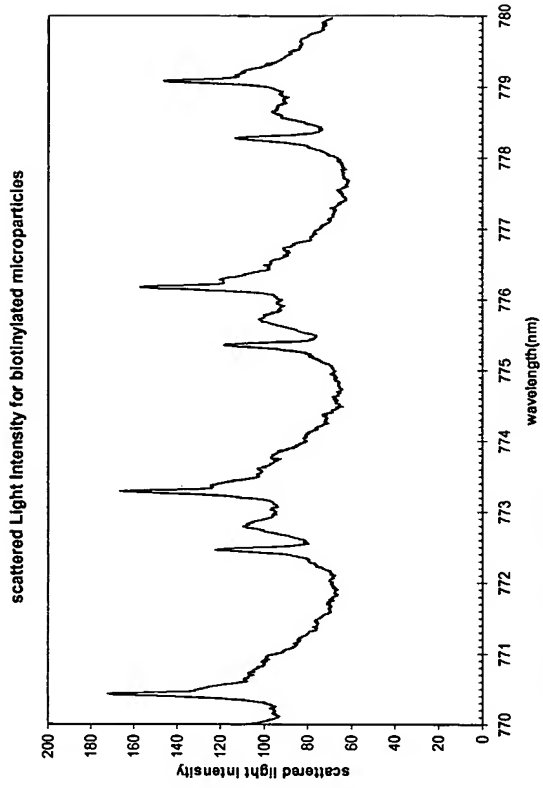


Figure 10B

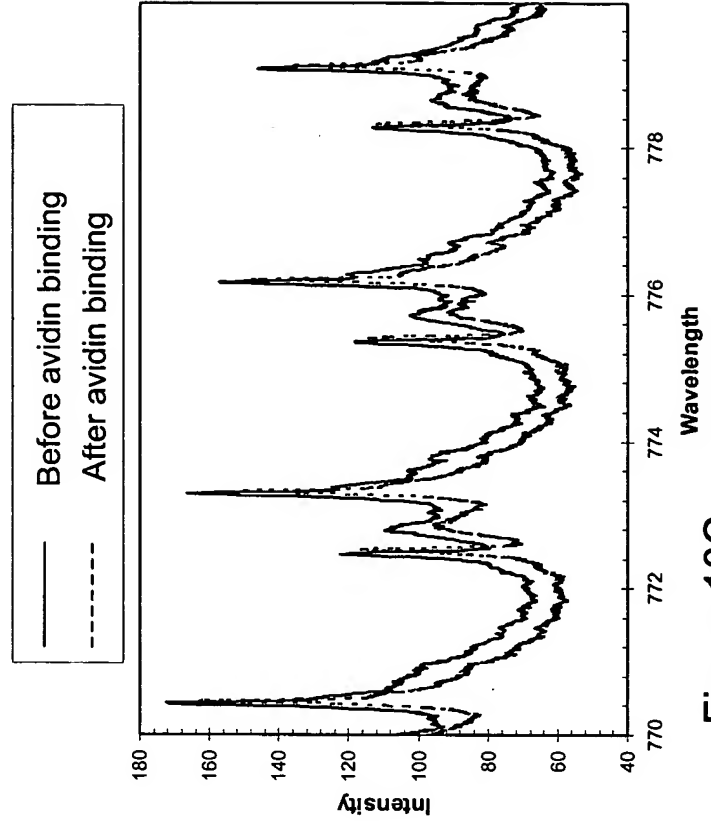


Figure 10C

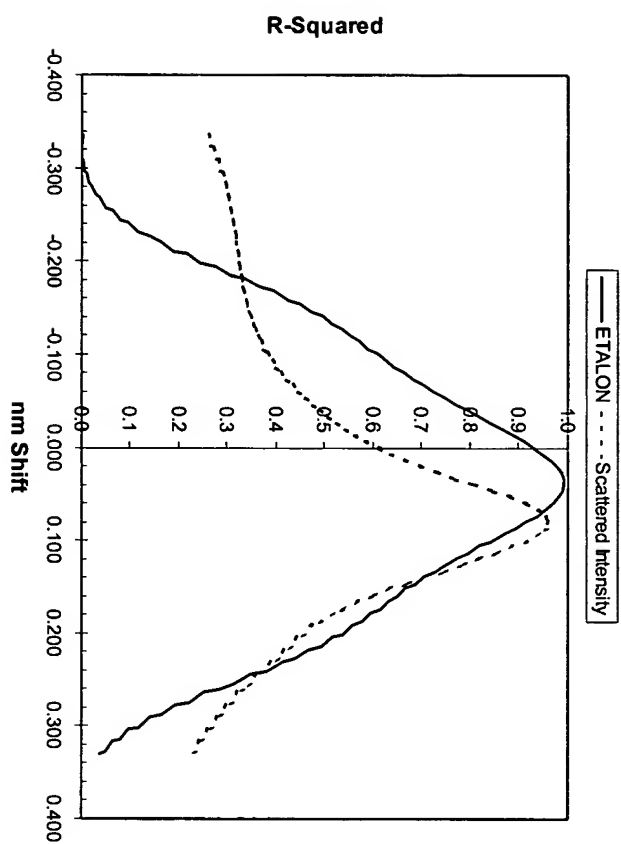


Figure 11

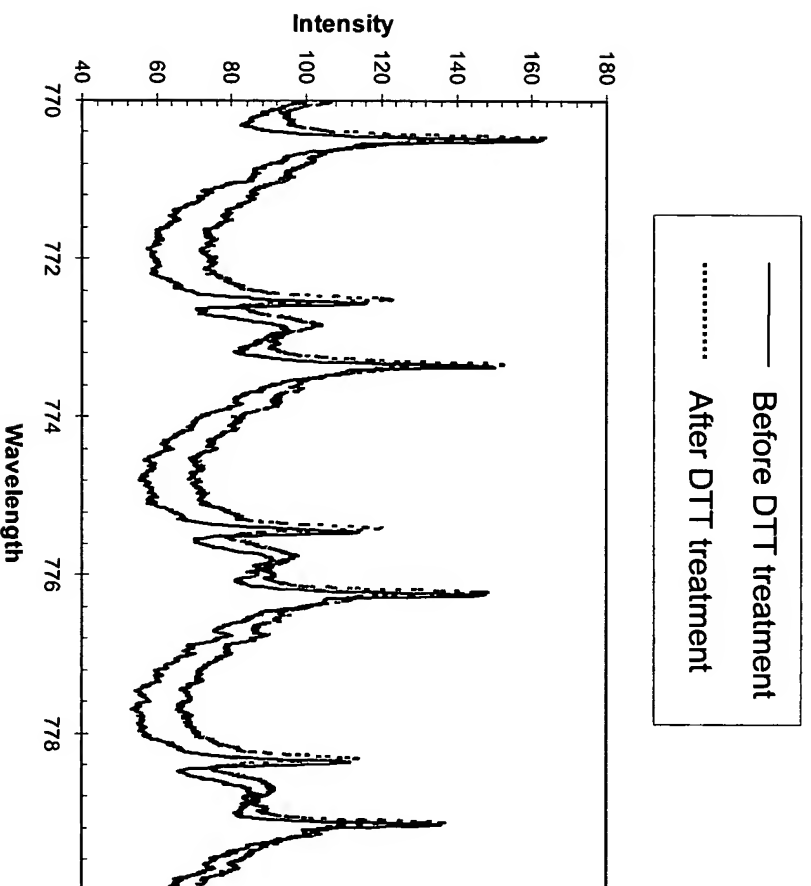


Figure 12

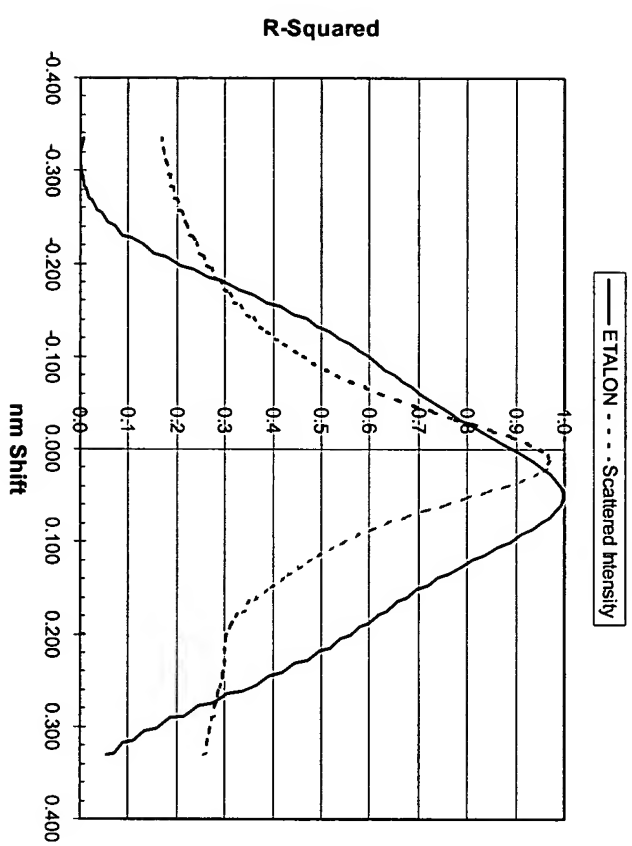


Figure 13

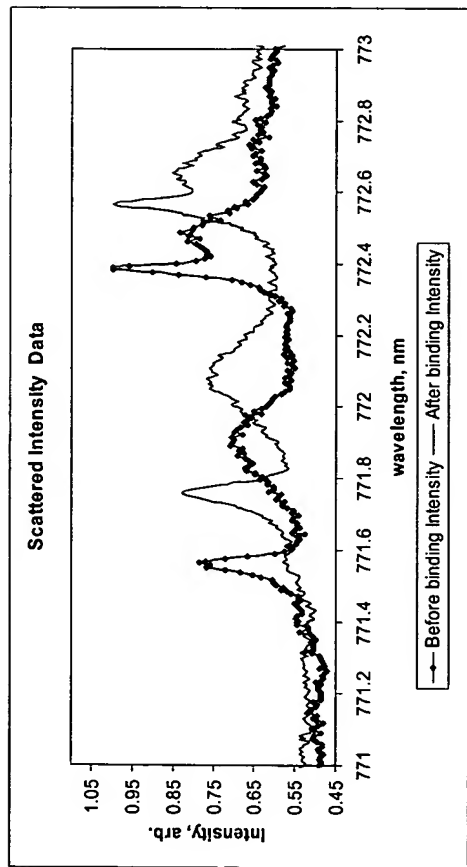


Figure 14A

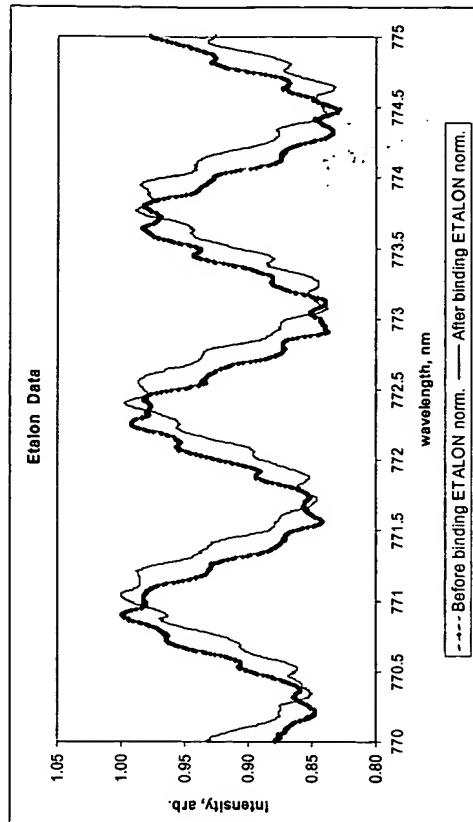


Figure 14B

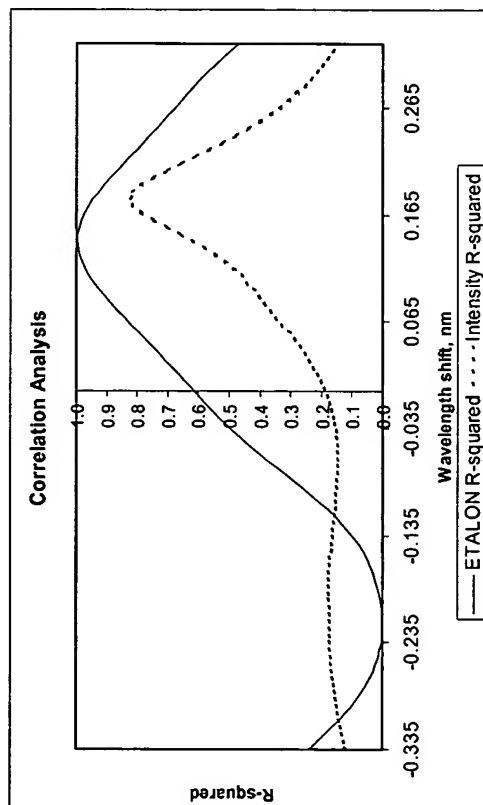


Figure 14C

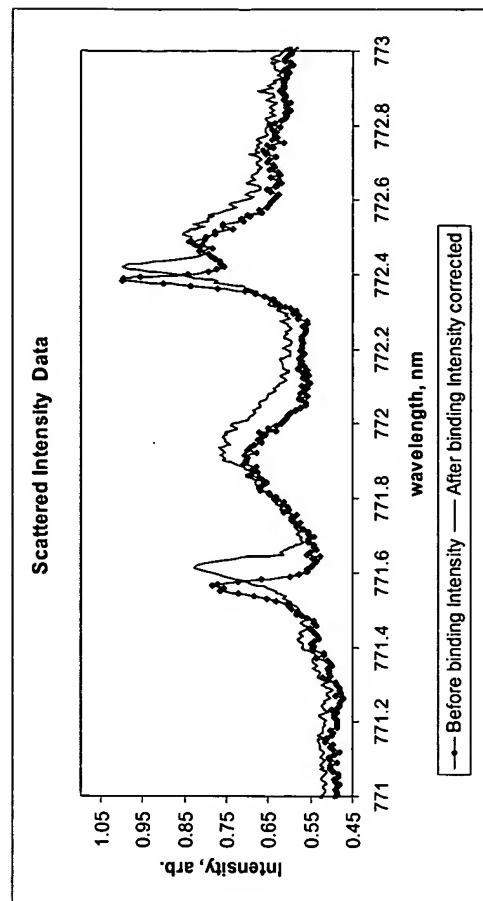


Figure 14D

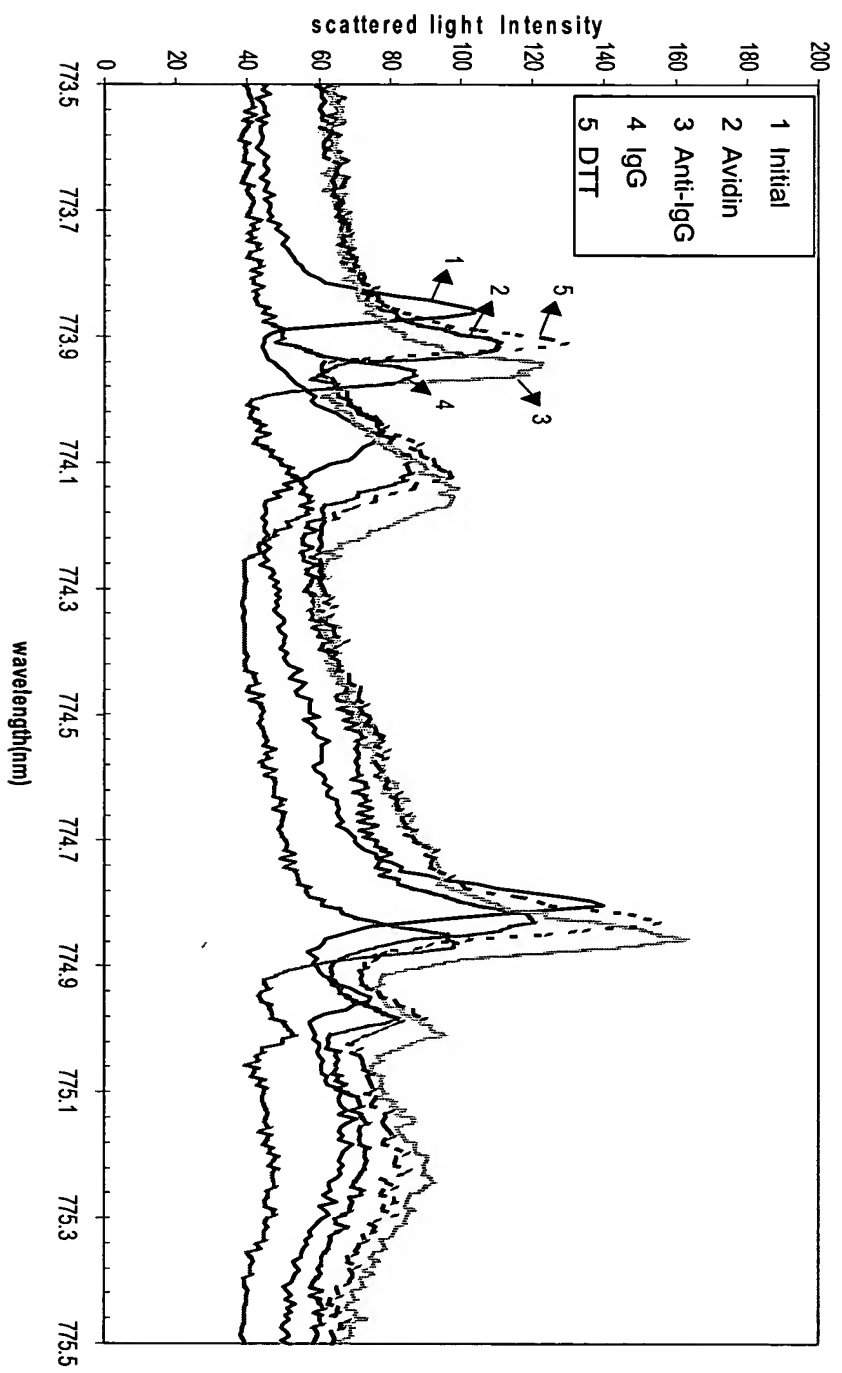


Figure 15

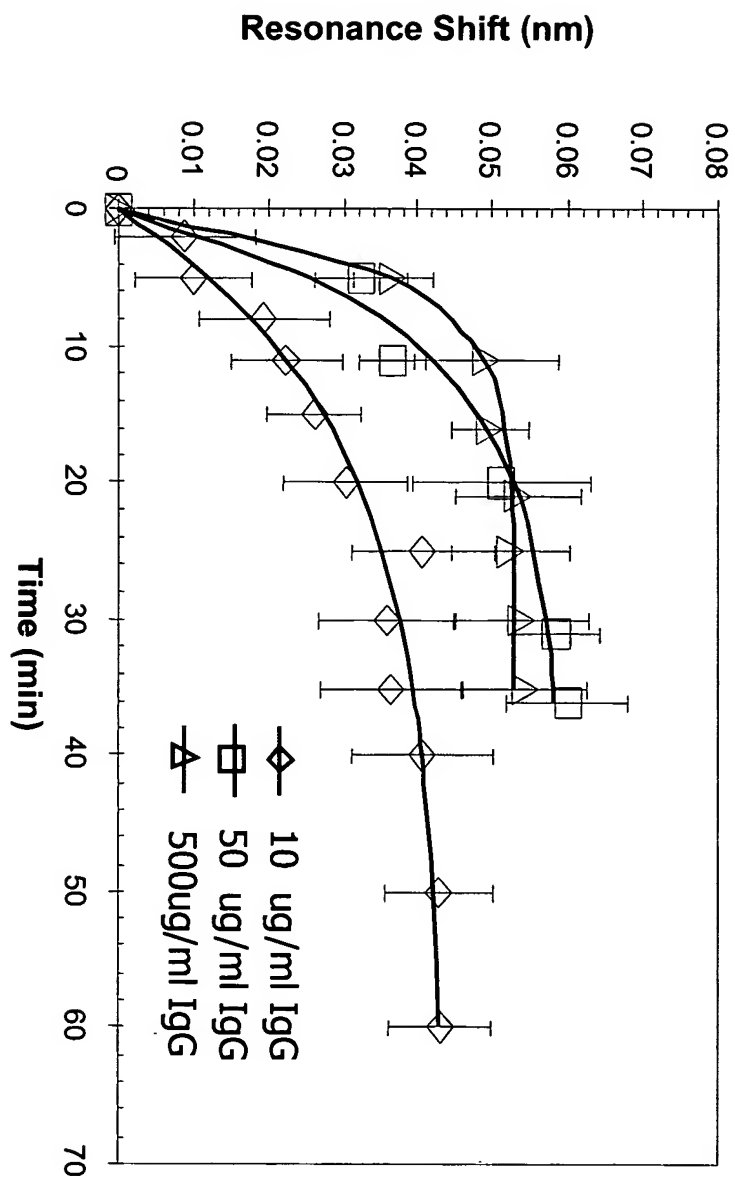
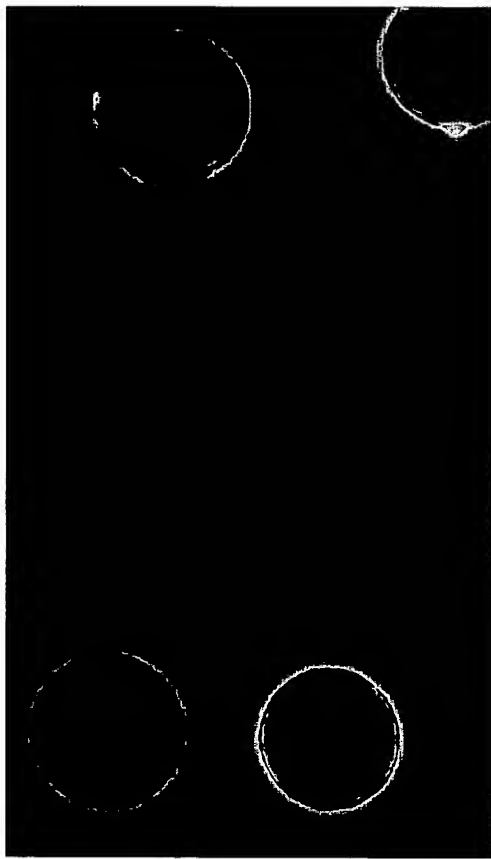


Figure 16



A



B

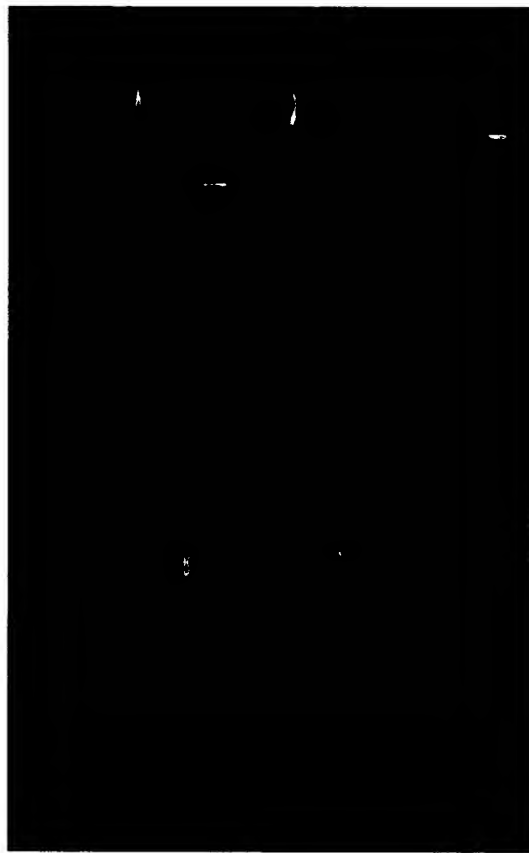
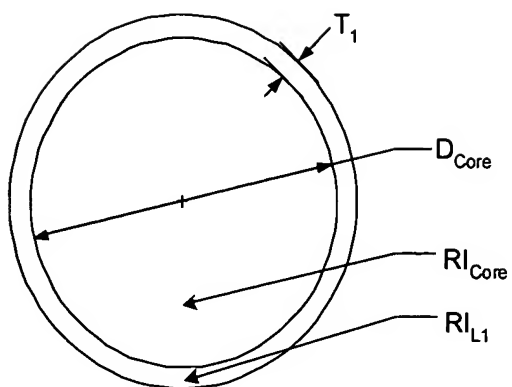
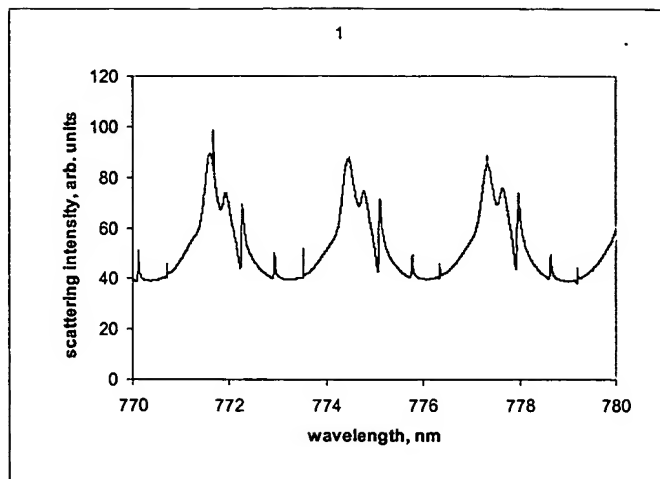


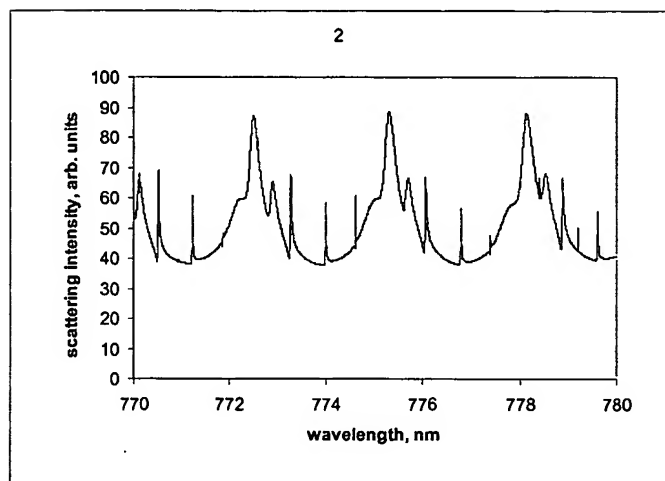
Figure 17



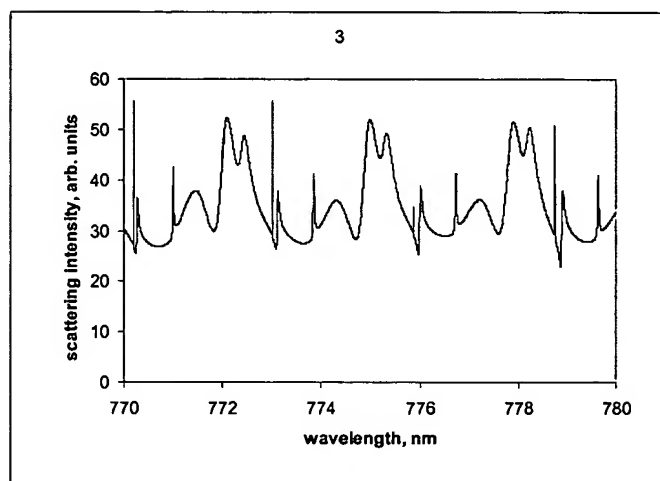
Reference particle for Example 14  
High RI core plus one layer, one set of  
resonances



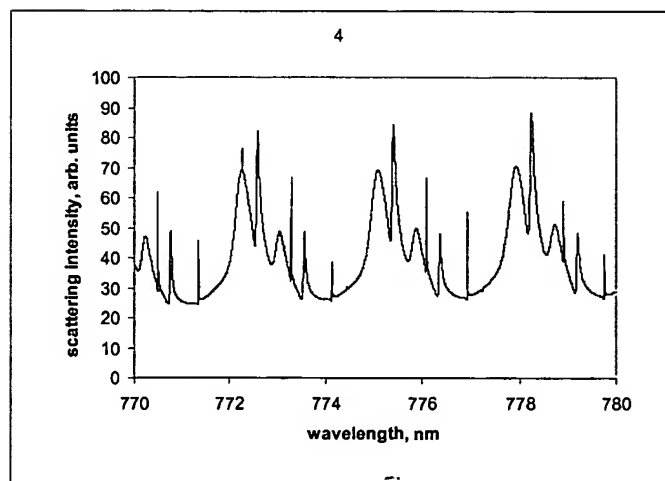
Scattering spectrum for reference particle 1



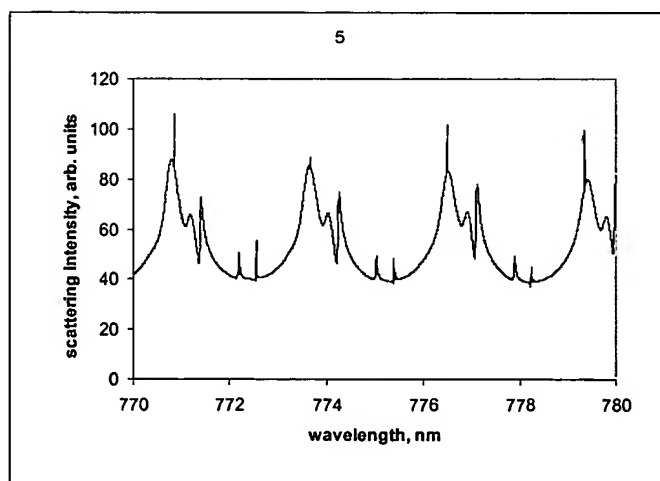
Scattering spectrum for particle 2



Scattering spectrum for particle 3

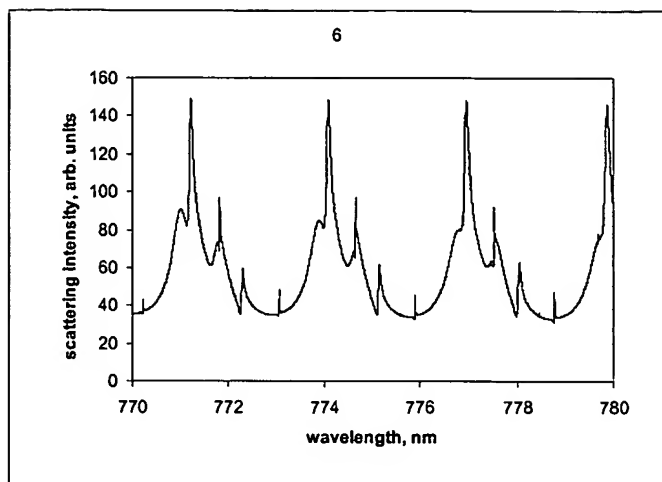


Scattering spectrum for particle 4

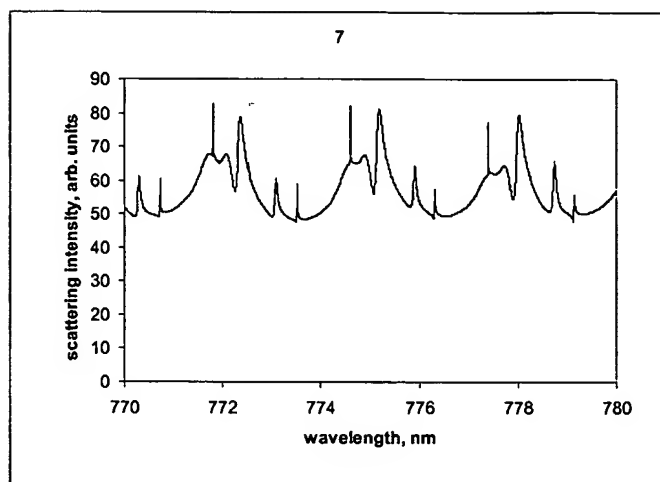


Scattering spectrum for particle 5

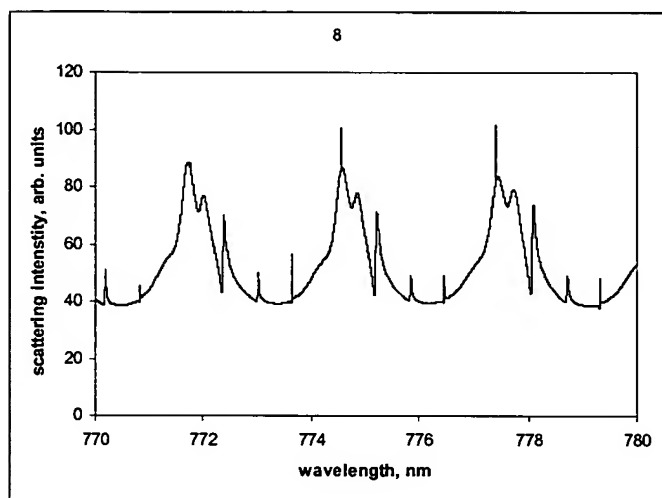
Figure 18



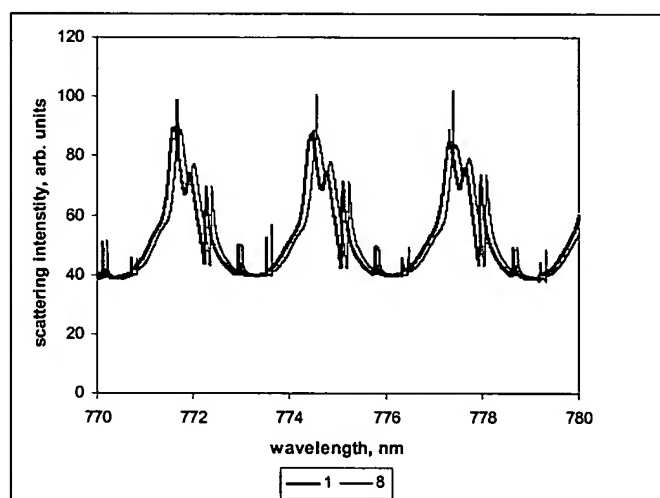
Scattering spectrum for particle 6



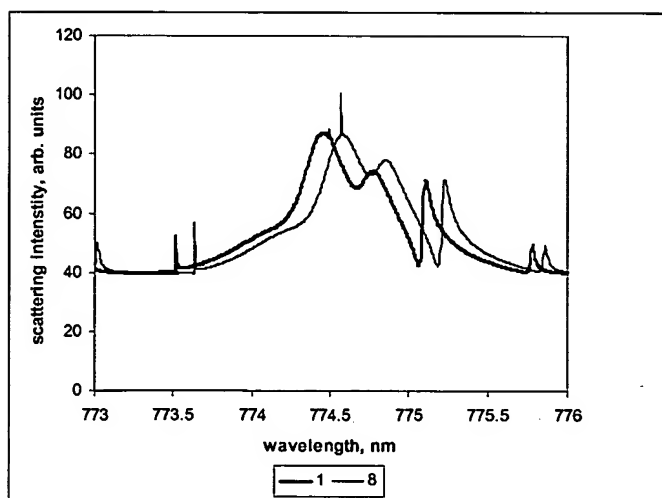
Scattering spectrum for particle 7



Scattering spectrum for particle 8 addition of 10 nm protein layer

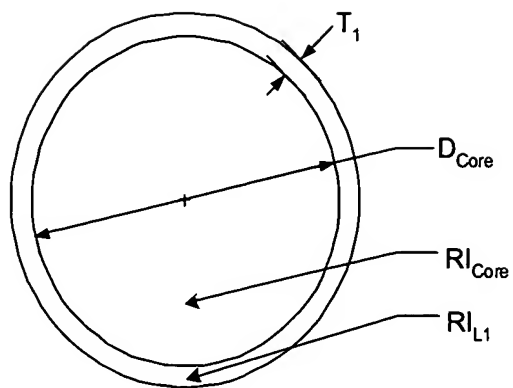


Scattering spectra for particles 1 and 8 compared

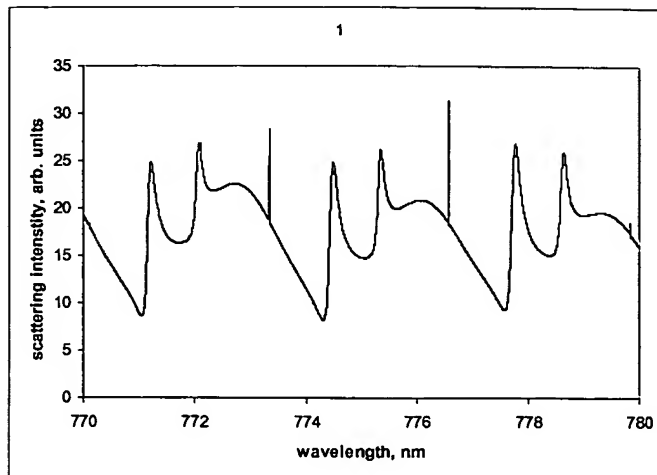


Particles 1 and 2 compared (expanded scale)

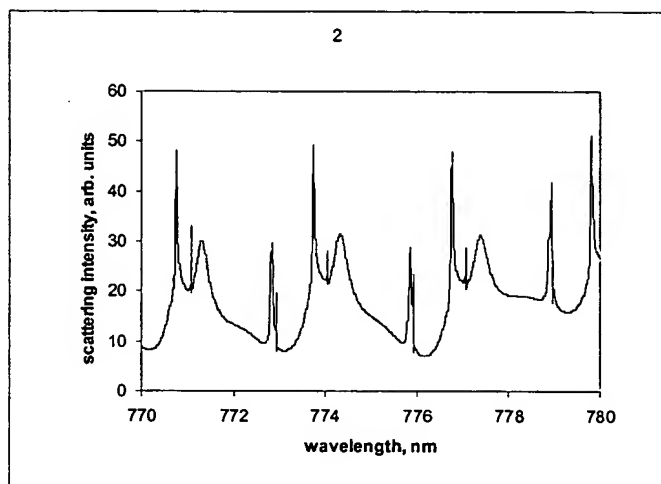
Figure 19



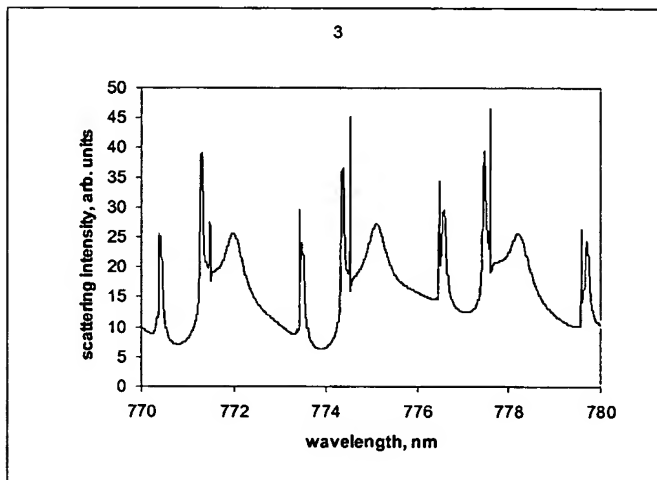
Reference particle for Example 15  
Low RI core plus one layer, one set of  
resonances



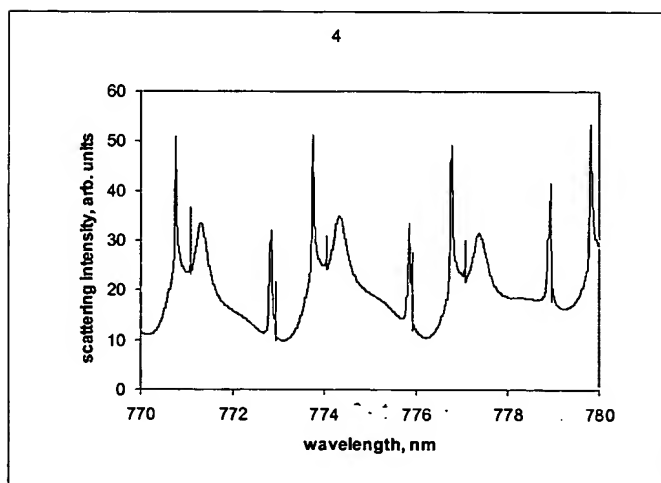
Scattering spectrum for particle 1



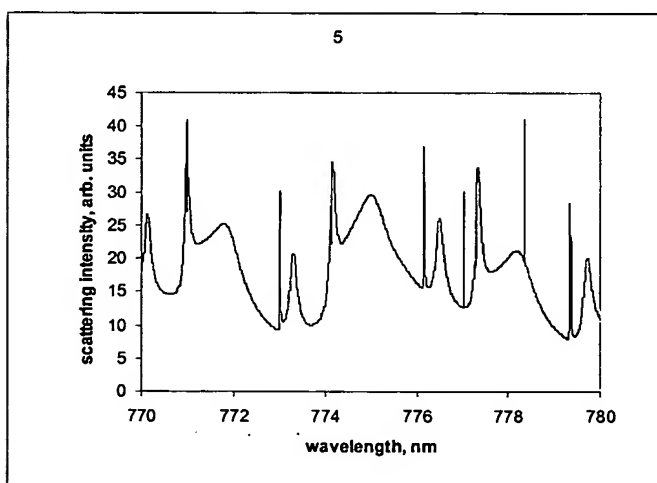
Scattering spectrum for reference particle 2



Scattering spectrum for particle 3

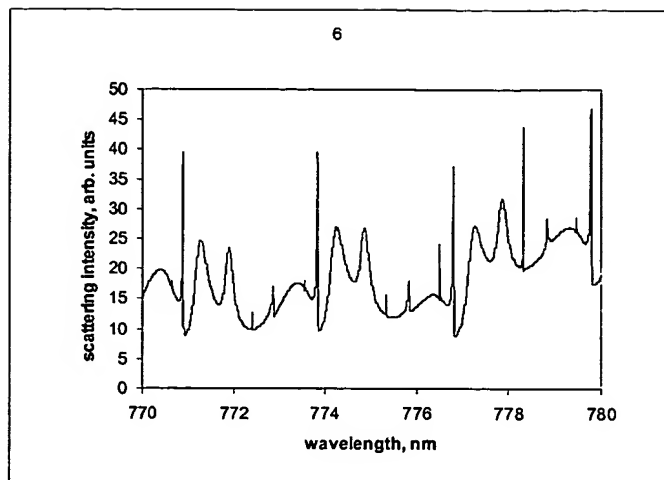


Scattering spectrum for particle 4

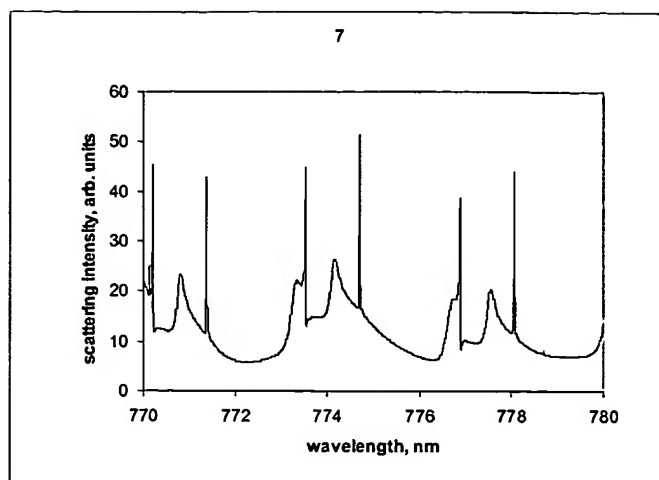


Scattering spectrum for particle 5

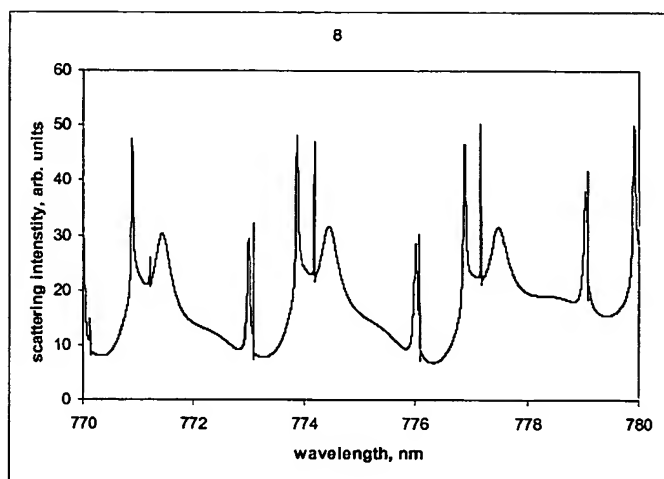
Figure 20



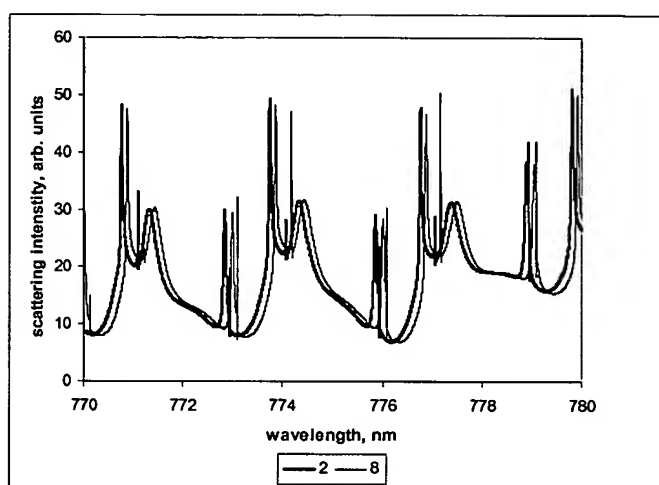
Scattering spectrum for particle 6



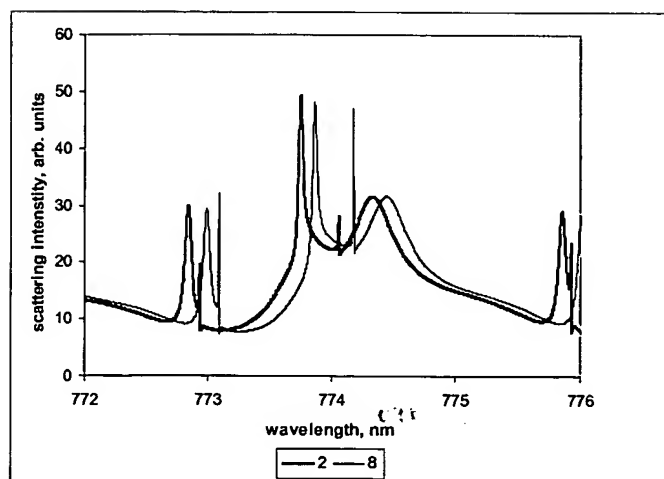
Scattering spectrum for particle 7



Scattering spectrum for particle 8 addition of 10 nm protein layer

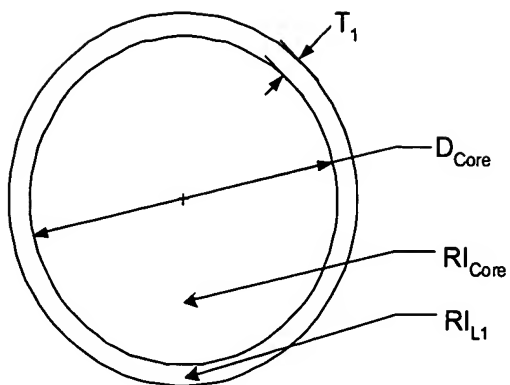


Scattering spectra for particles 2 and 8 compared

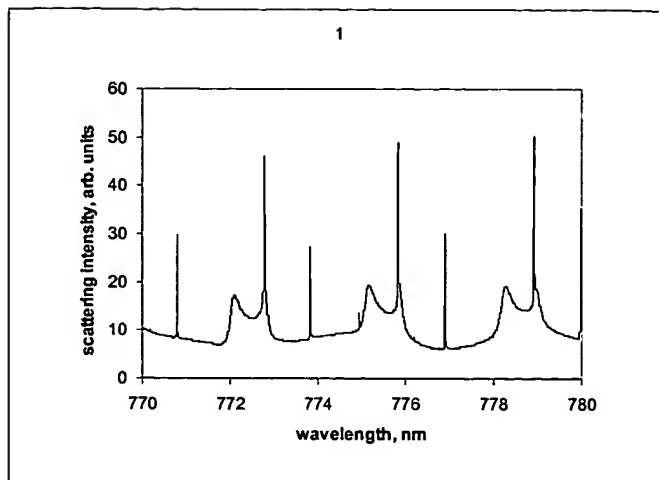


Particles 2 and 8 compared (expanded scale)

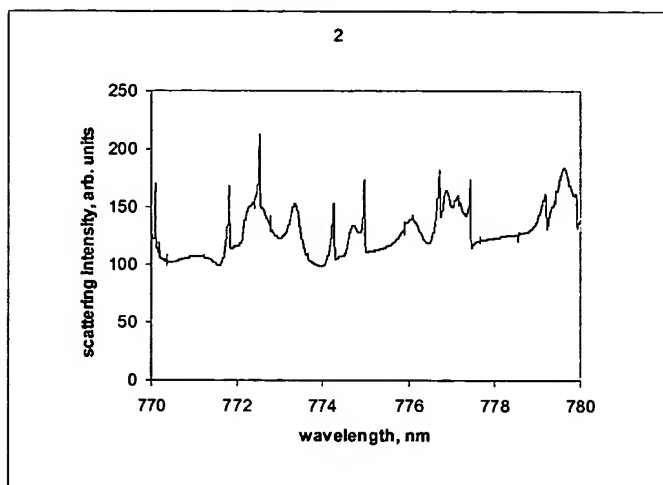
Figure 21



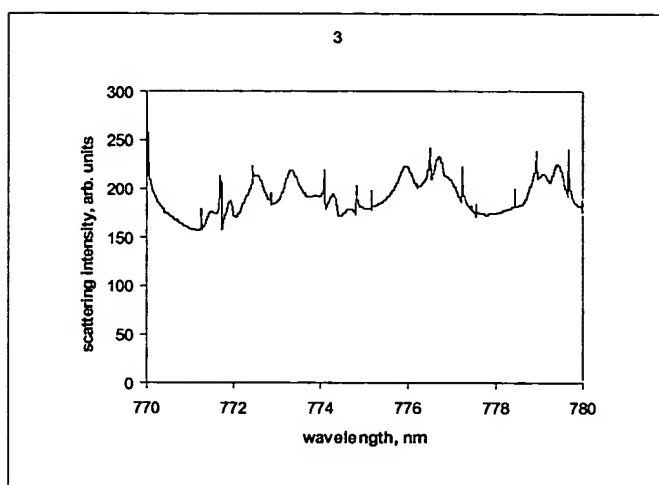
Reference particle for Example16  
High RI core plus one layer, two sets of  
resonances



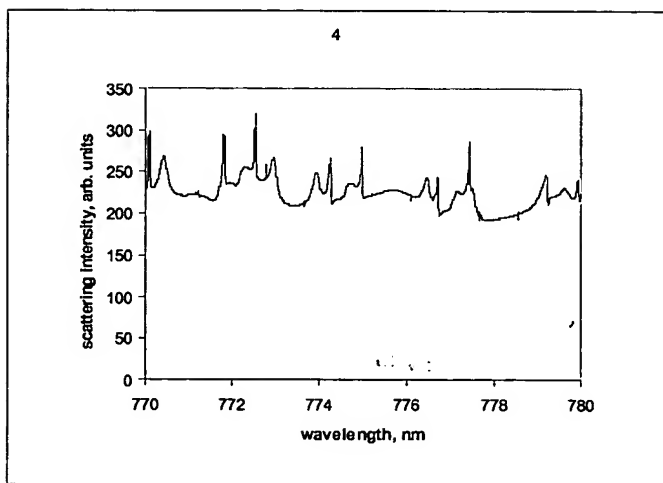
Scattering spectrum for particle 1



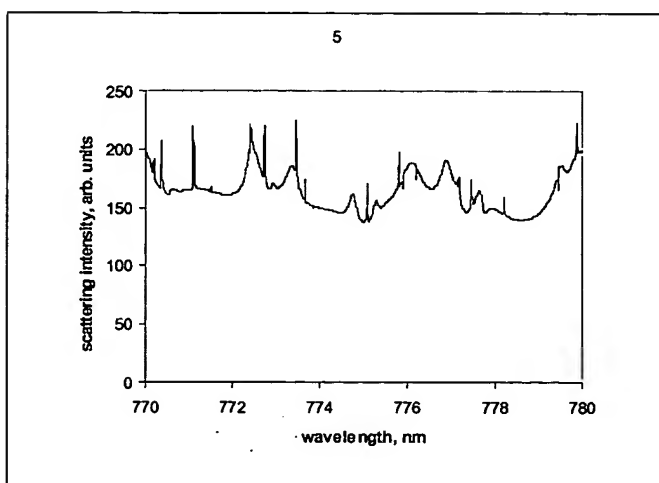
Scattering spectrum for reference particle 2



Scattering spectrum for particle 3

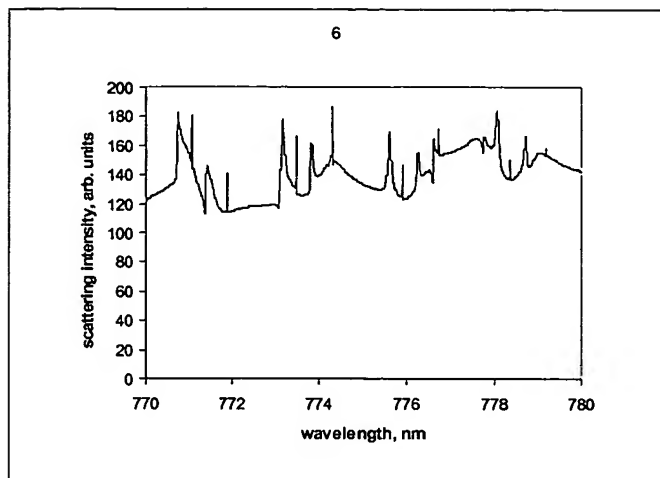


Scattering spectrum for particle 4

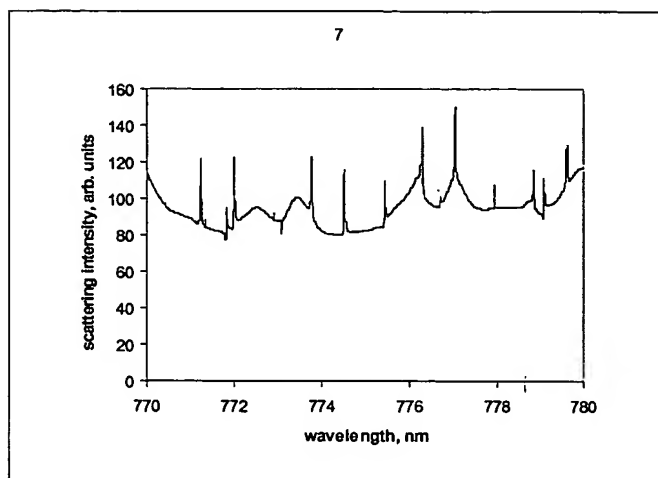


Scattering spectrum for particle 5

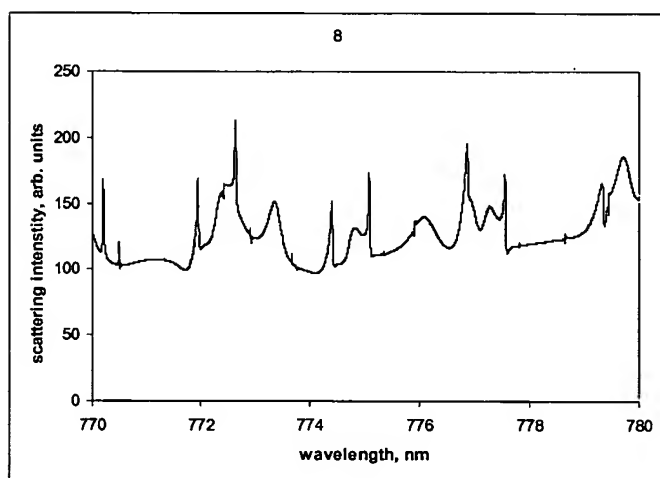
Figure 22



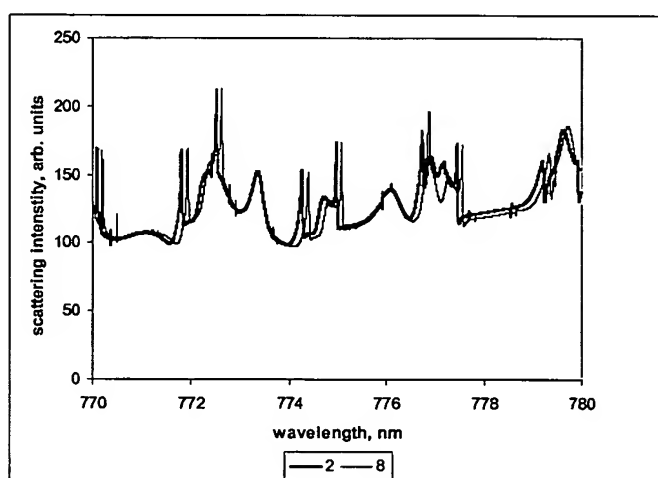
Scattering spectrum for particle 6



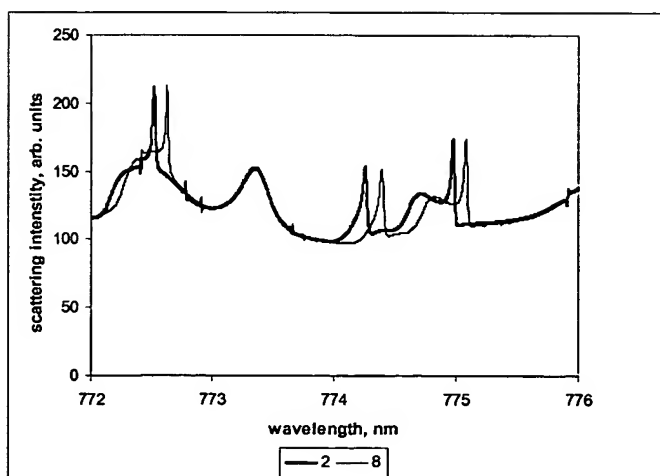
Scattering spectrum for particle 7



Scattering spectrum for particle 8 addition of 10 nm protein layer

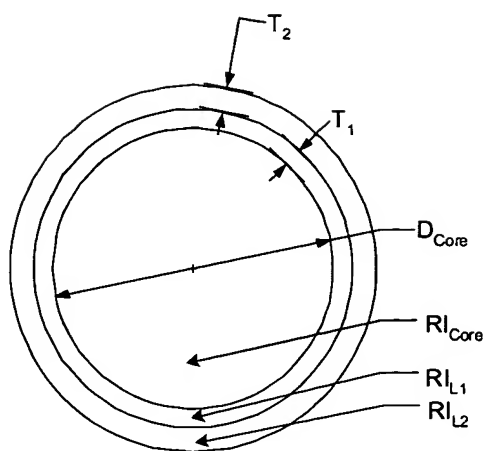


Scattering spectra for particles 2 and 8 compared

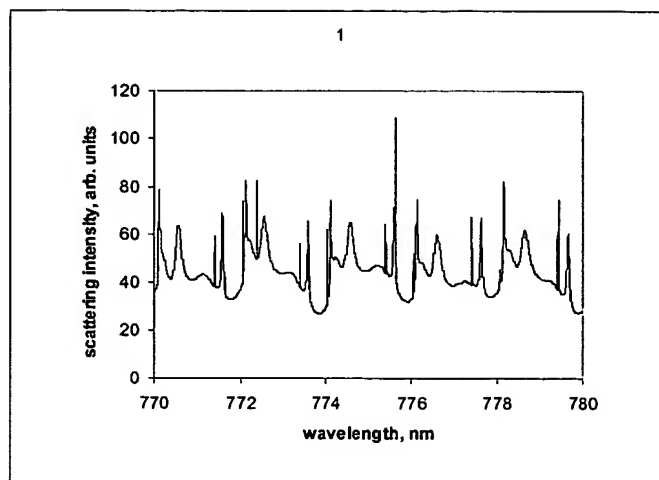


Particles 2 and 8 compared (expanded scale)

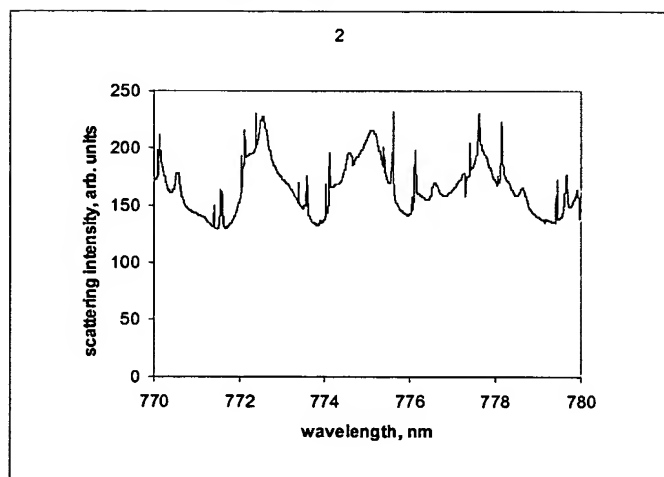
Figure 23



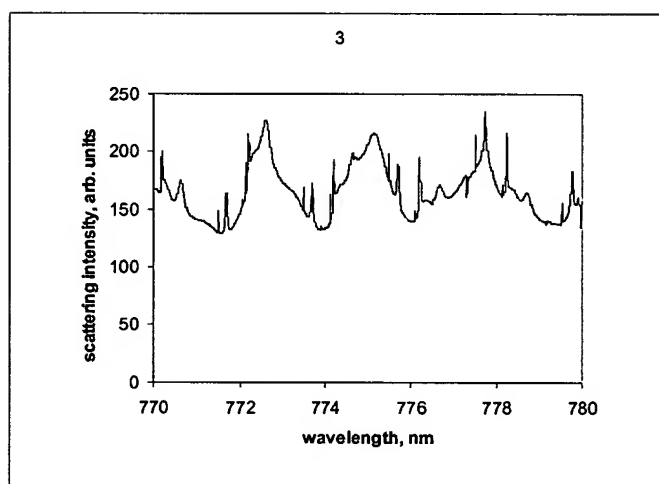
Reference particle for Example 17  
Low RI Core plus 2 layer, 2 sets of  
resonances



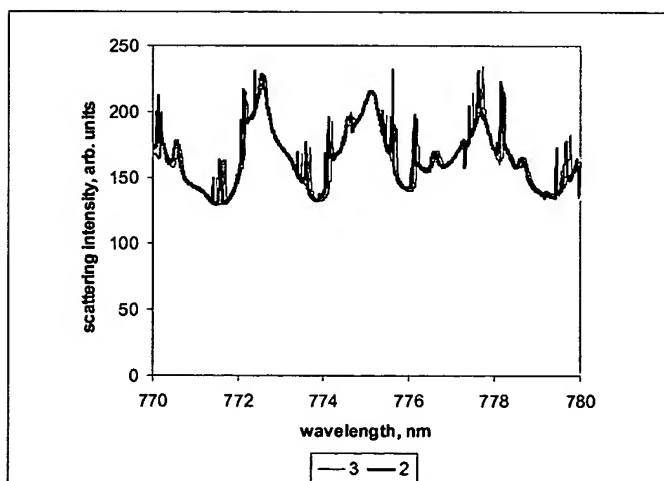
Scattering spectrum for particle 1



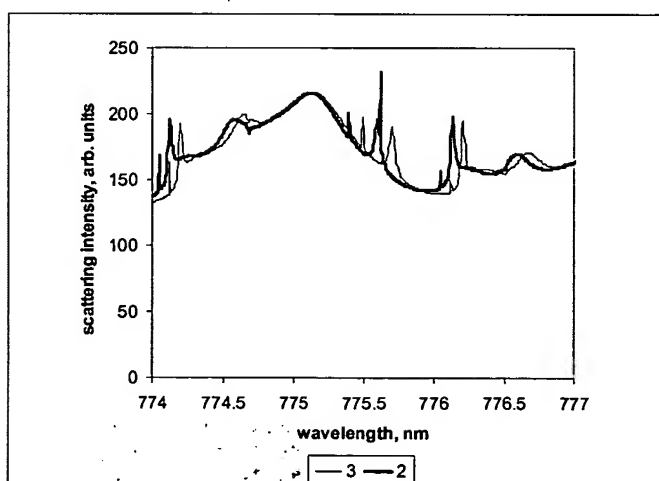
Scattering spectrum for reference particle 2



Scattering spectrum for particle 3



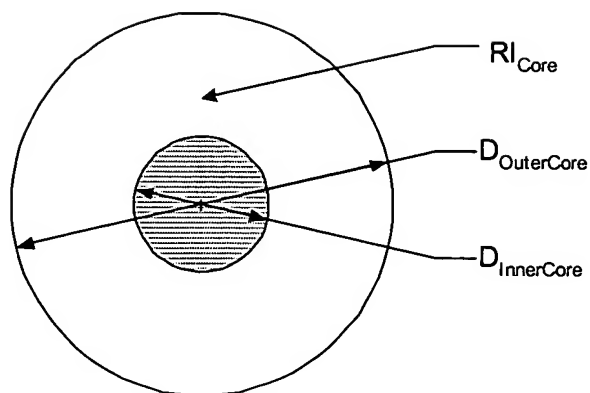
Scattering spectra for particles 2 and 3  
compared



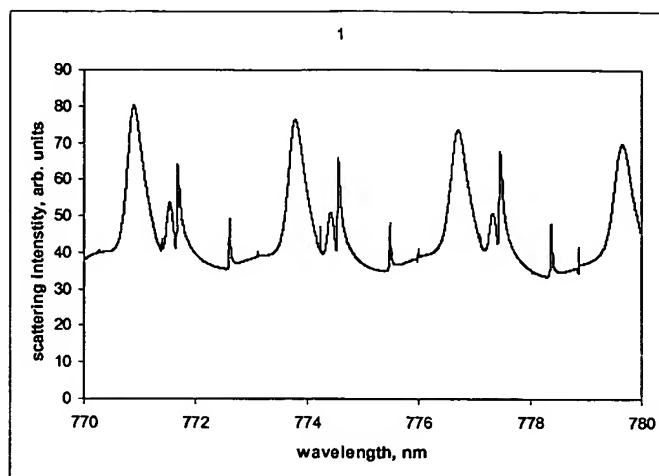
Particles 2 and 3 compared (expanded scale)

Figure 24

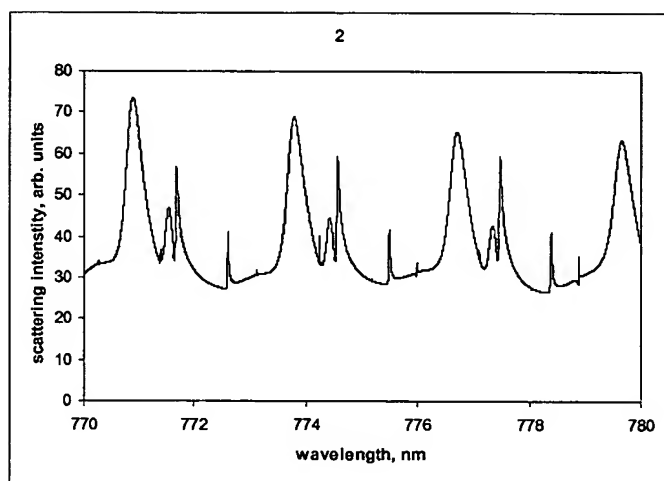




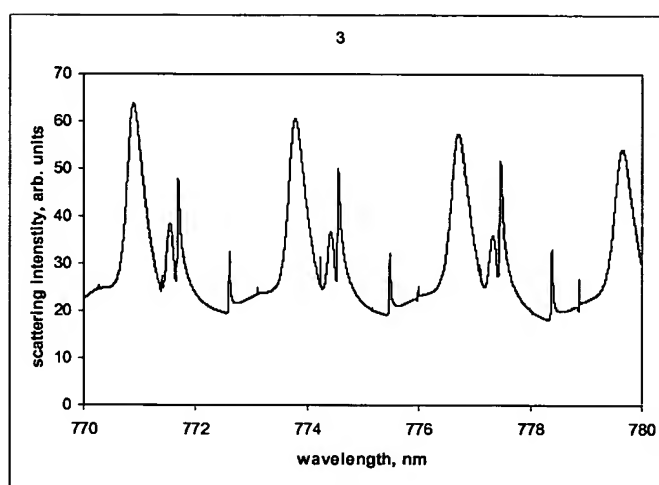
Reference particle for Example 18  
Core with black center



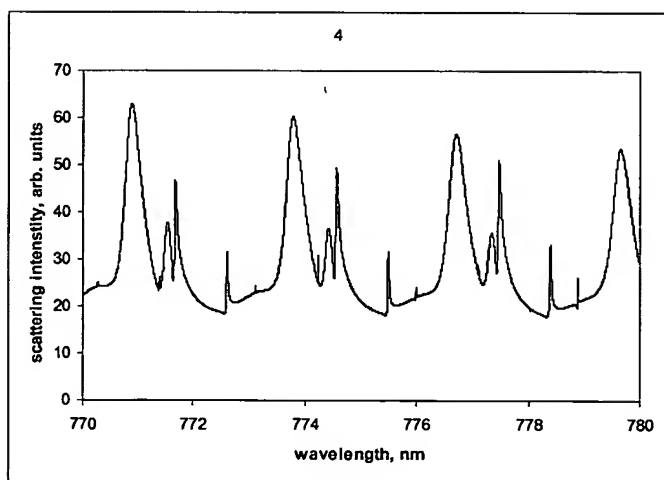
Scattering spectrum for particle 1



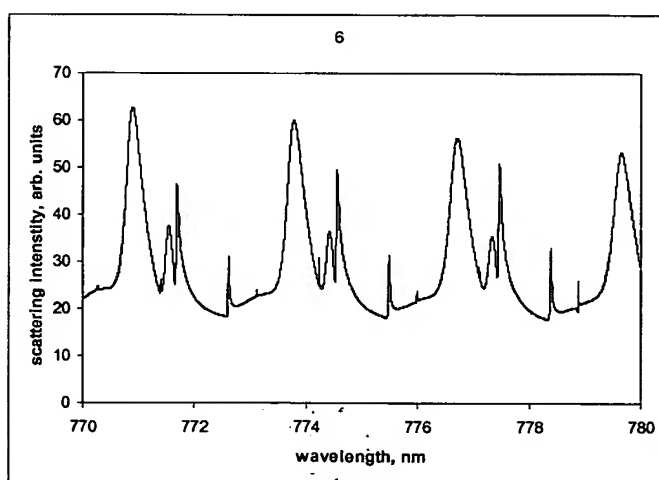
Scattering spectrum for particle 2, 5  $\mu$  core



Scattering spectrum for particle 3, 10  $\mu$  core

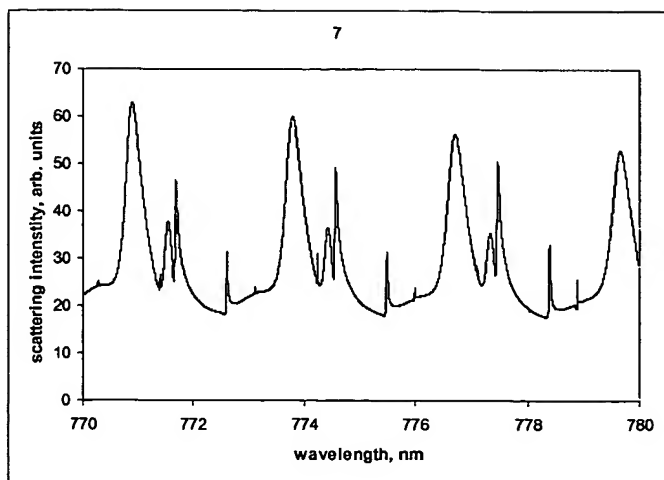


Scattering spectrum for particle 4, 15  $\mu$  core

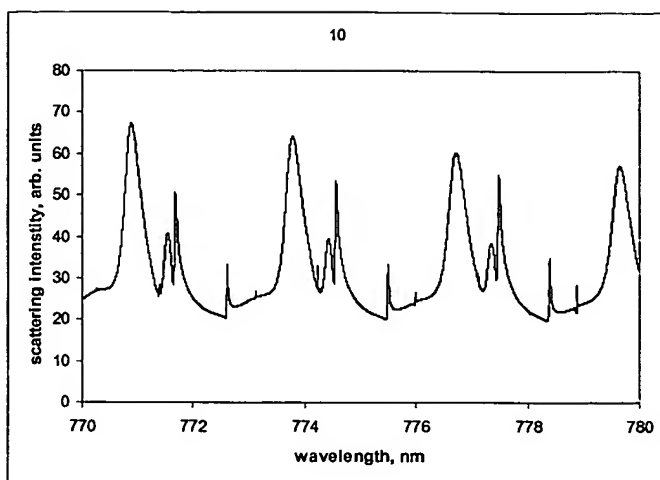


Scattering spectrum for particle 6, 25  $\mu$  core

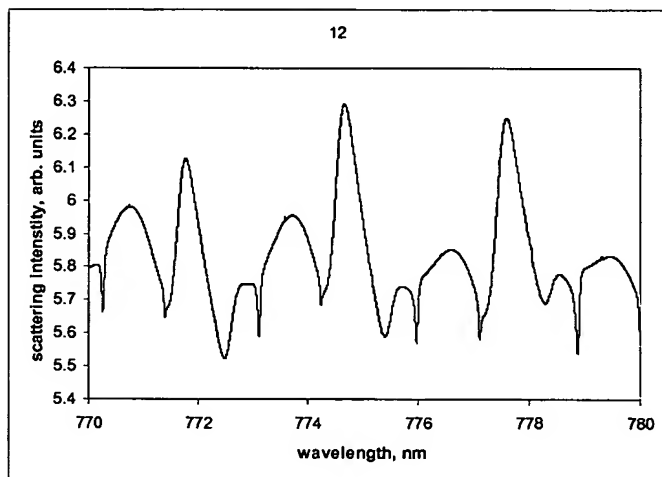
Figure 25



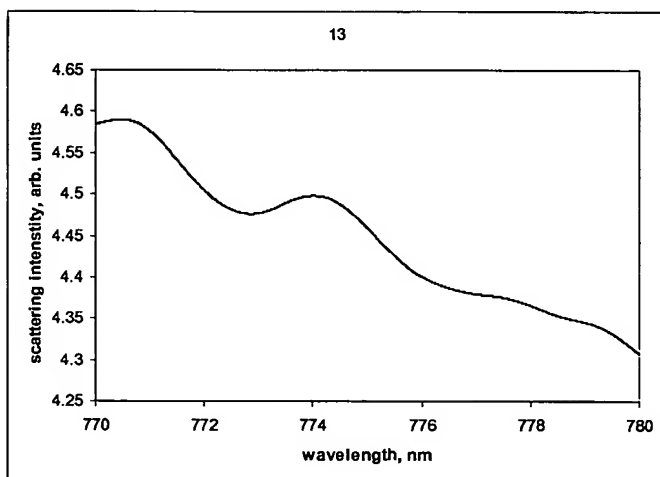
Scattering spectrum for particle 7 , 26  $\mu$  core



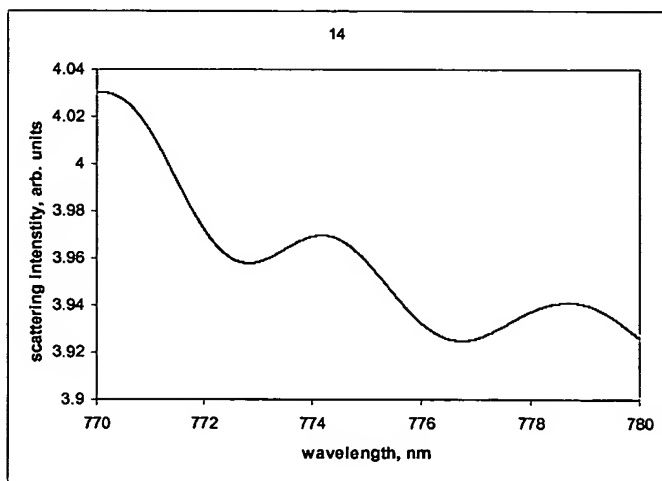
Scattering spectrum for particle 10 , 29  $\mu$  core



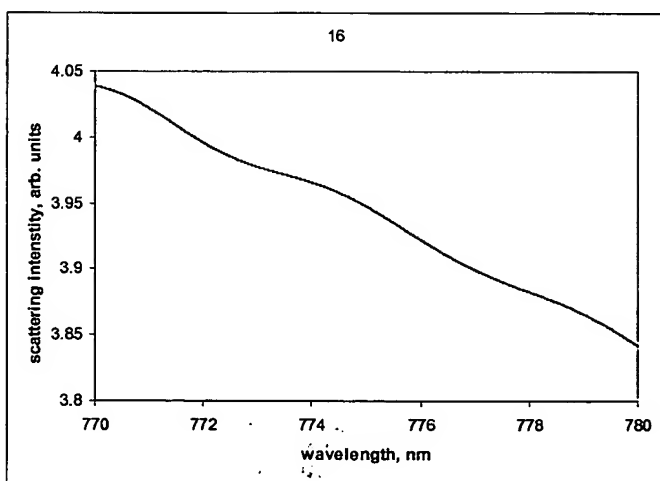
Scattering spectrum for particle 12 , 31  $\mu$  core



Scattering spectrum for particle 13 , 32  $\mu$  core

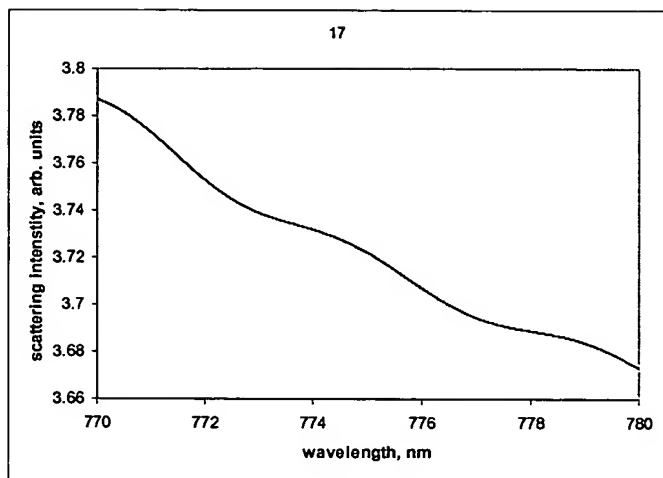


Scattering spectrum for particle 13 , 33  $\mu$  core

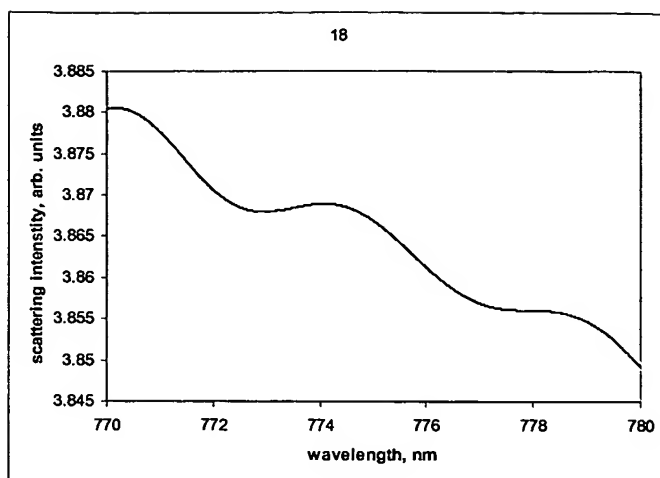


Scattering spectrum for particle 13 , 35  $\mu$  core

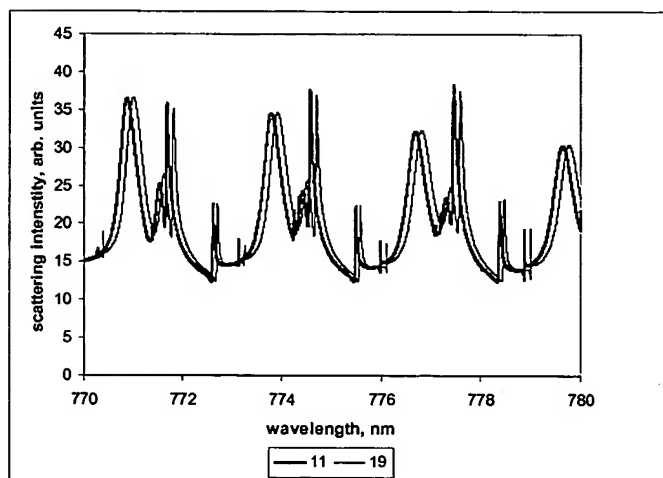
Figure 26



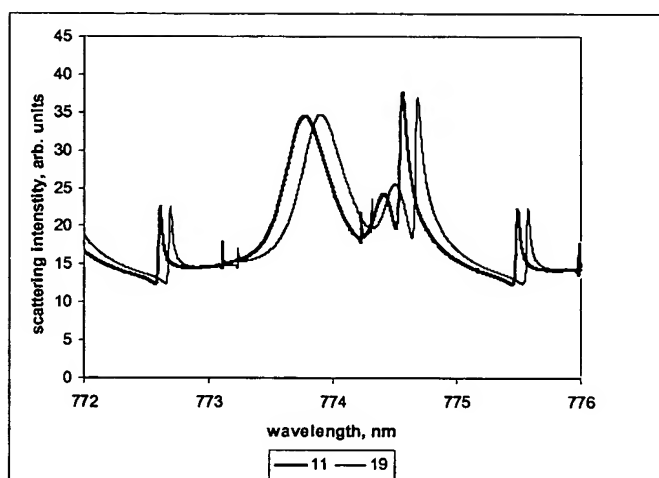
Scattering spectrum for particle 17 , 36  $\mu$  core



Scattering spectrum for particle 18 , 37  $\mu$  core

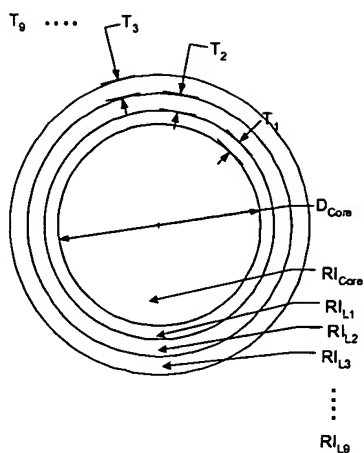


Scattering spectra for particles 11 and 19 compared (reference particle with and without protein binding)

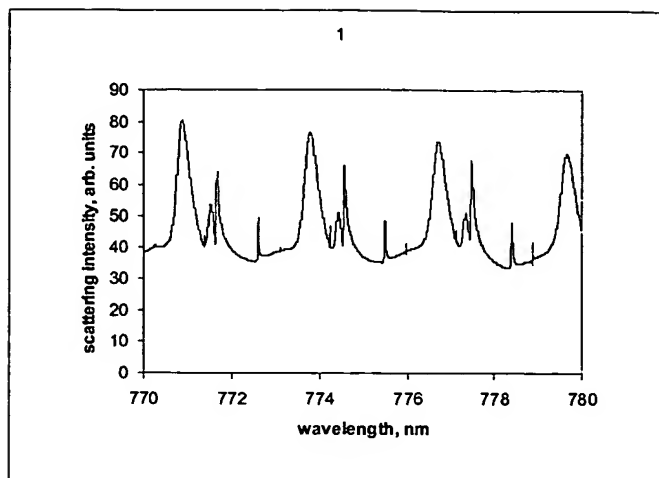


Scattering spectra for particles 11 and 19 compared (expanded scale)

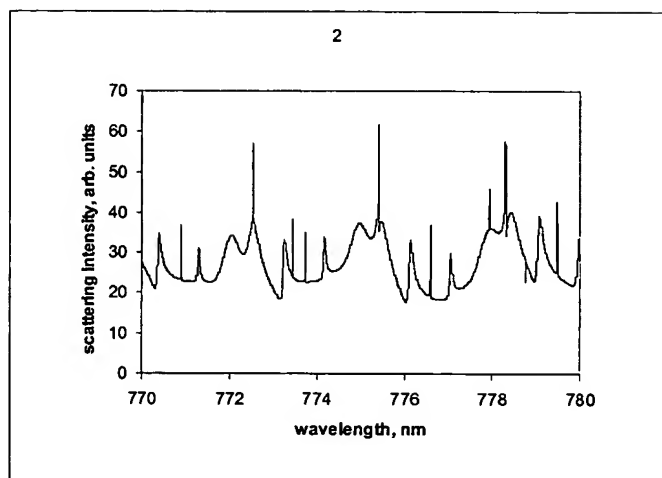
Figure 27



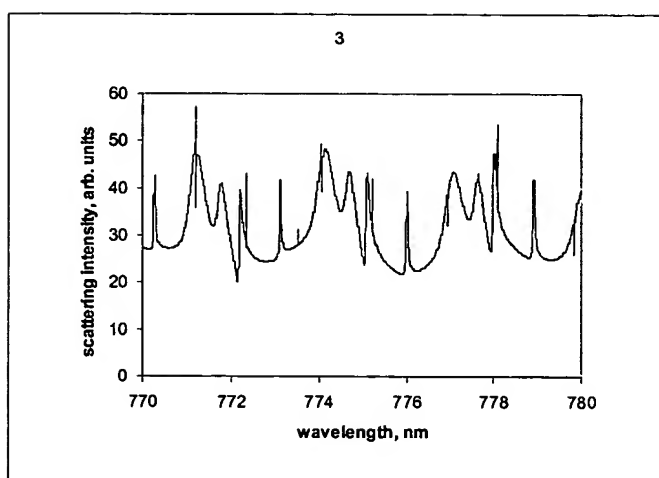
Reference particle for Example 19  
Radially varying refractive index in core



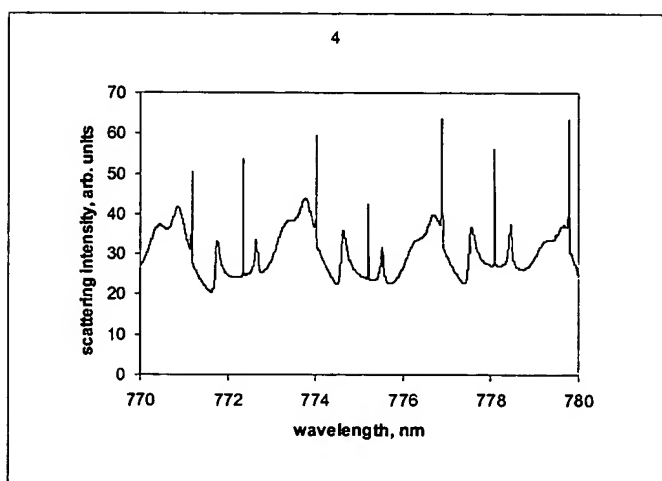
Scattering spectrum for particle 1



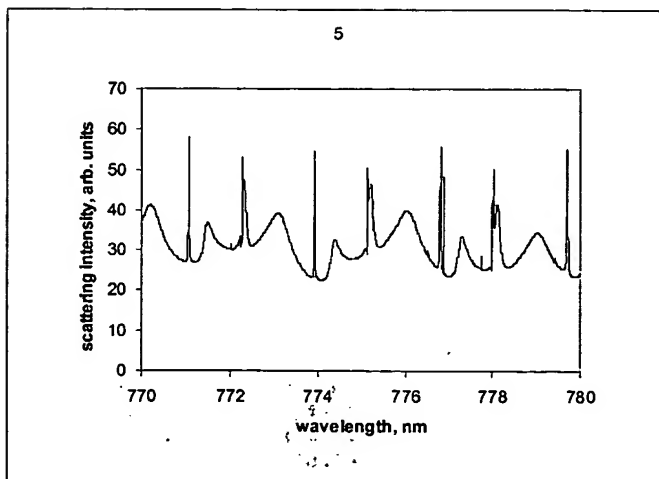
Scattering spectrum for particle 2



Scattering spectrum for particle 3

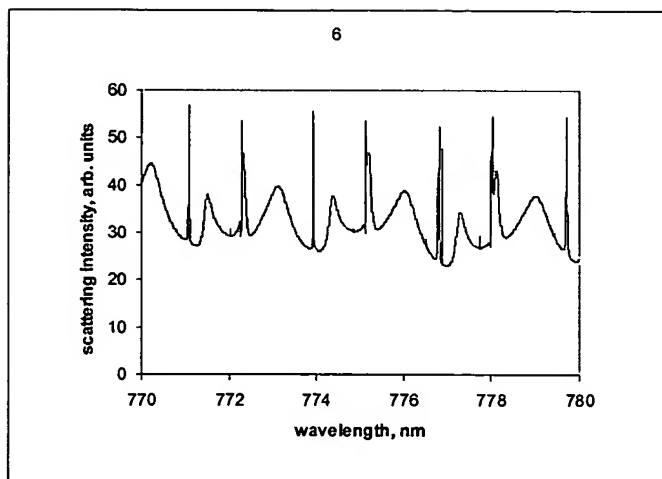


Scattering spectrum for particle 4

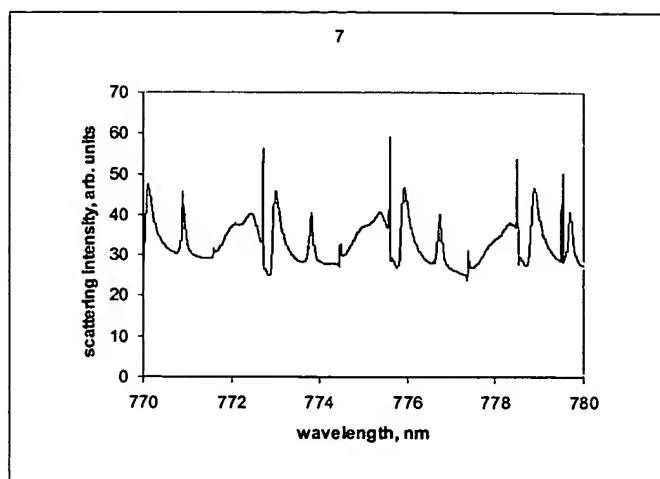


Scattering spectrum for reference particle 5

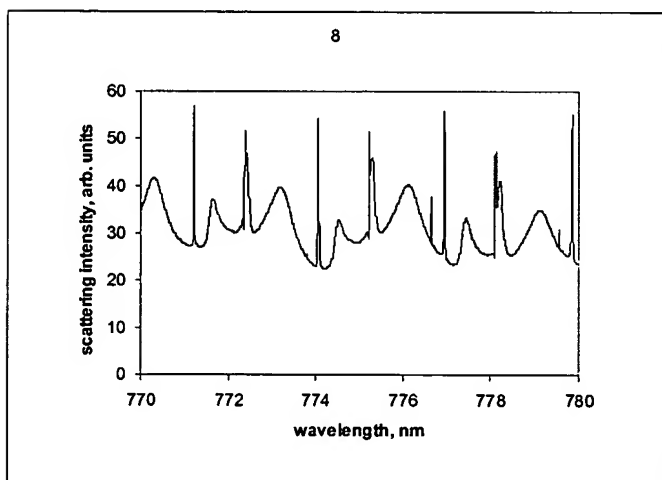
Figure 28



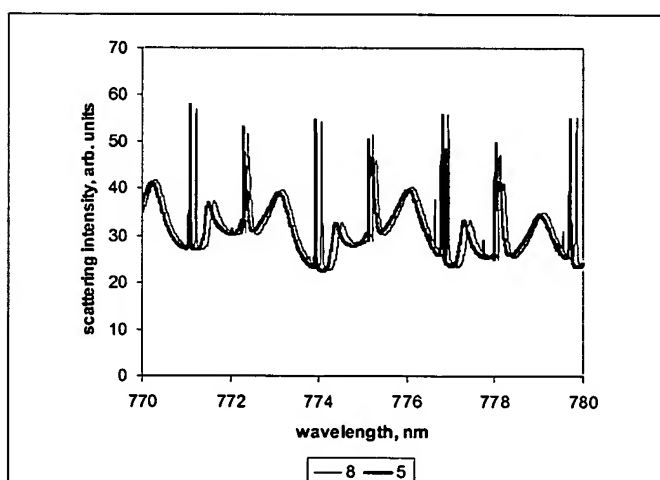
Scattering spectrum for particle 6



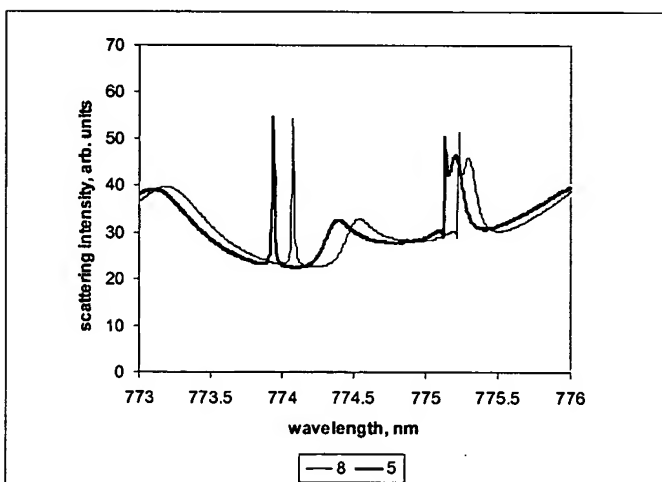
Scattering spectrum for particle 7



Scattering spectrum for particle 8

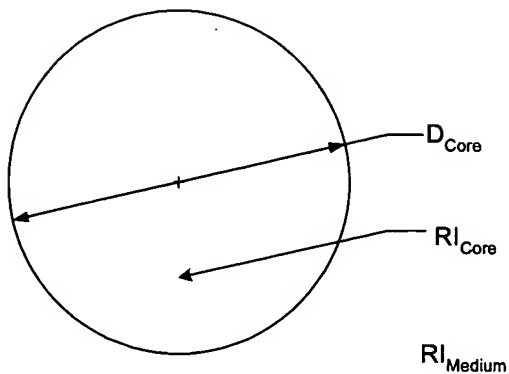


Scattering spectra for particles 5 and 8 compared

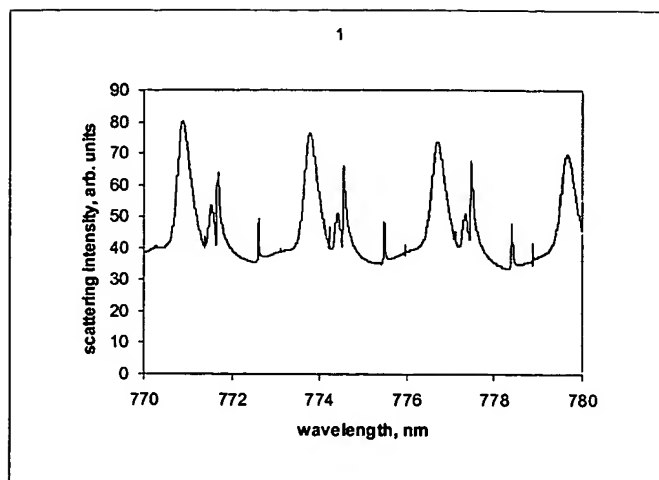


Particles 5 and 2 compared (expanded scale)

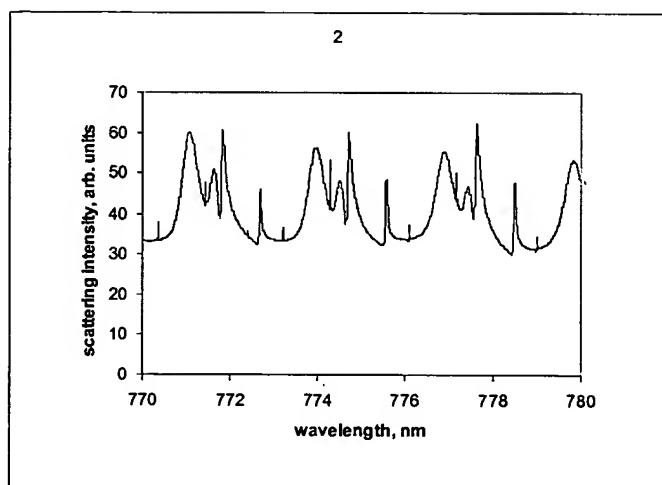
Figure 29



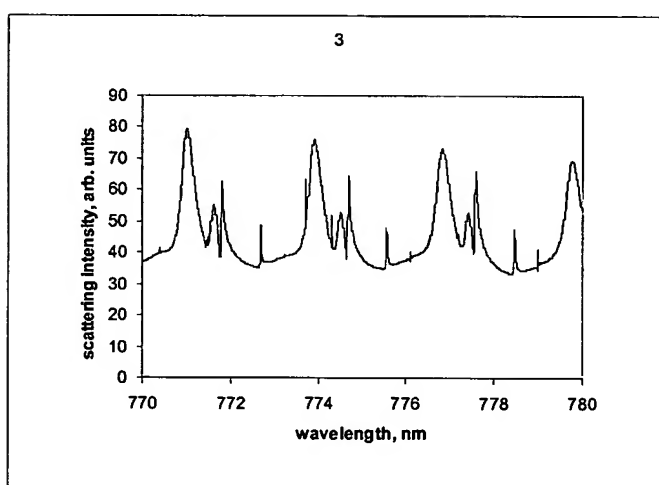
Reference particle for Example20  
Effect of medium refractive index



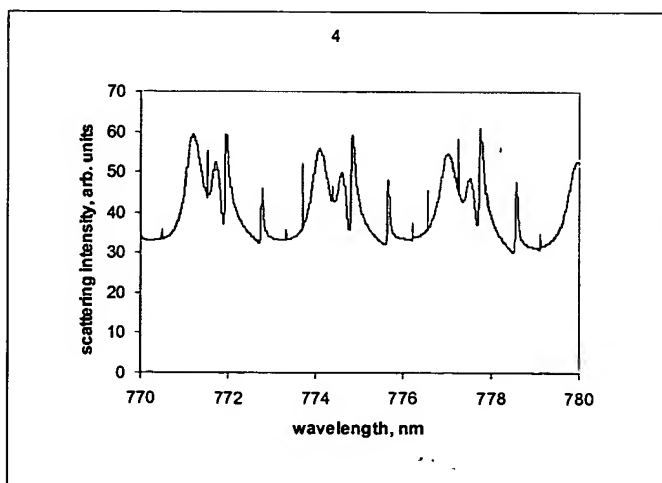
Scattering spectrum for reference particle 1



Scattering spectrum for particle 2

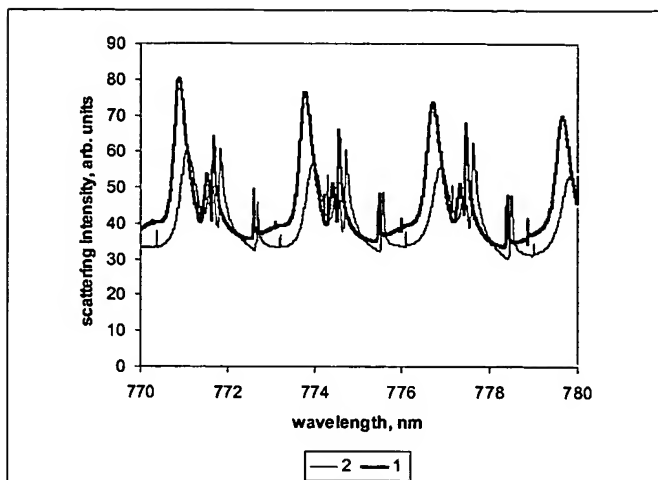


Scattering spectrum for particle 3

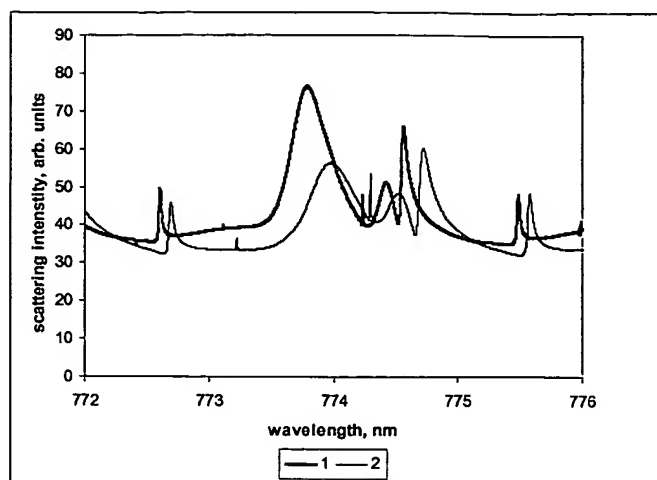


Scattering spectrum for particle 4

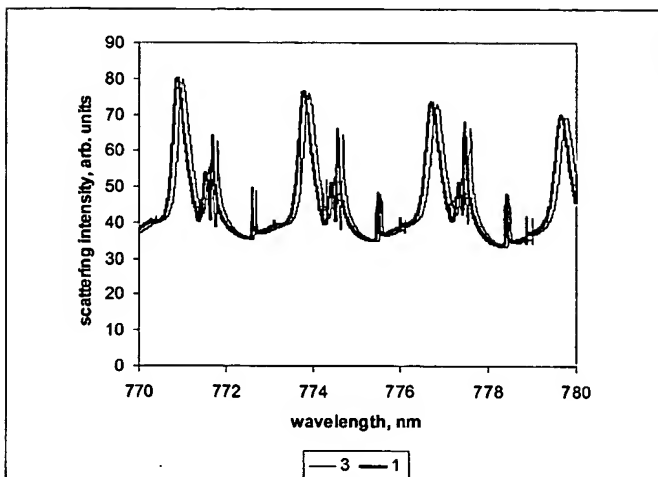
Figure 30



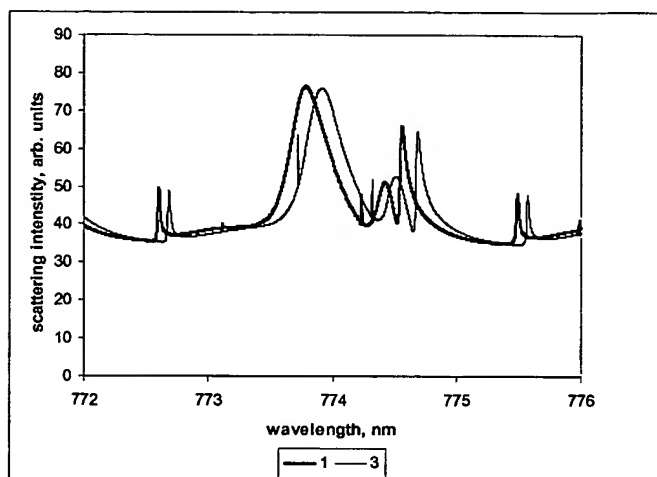
Scattering spectra for particles 1 and 2 compared (effect of refractive index)



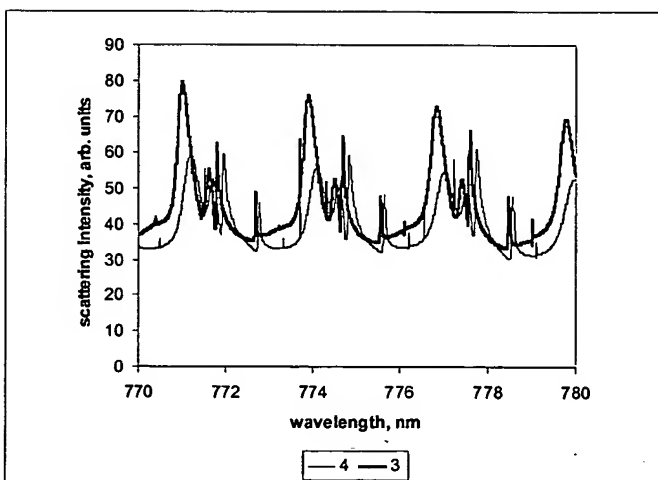
Scattering spectra for particles 1 and 2 compared (expanded scale)



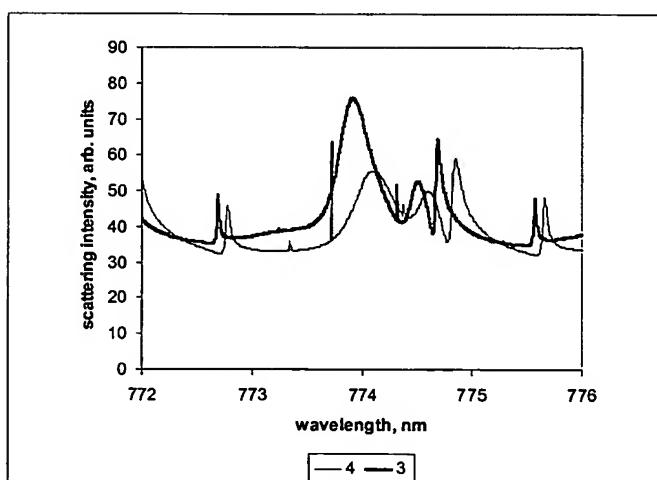
Scattering spectra for particles 1 and 3 compared (addition of protein layer to reference particle)



Scattering spectra for particles 1 and 3 compared (expanded scale)

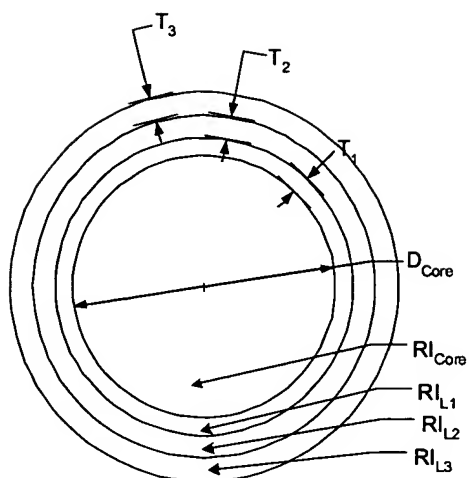


Scattering spectra for particles 3 and 4 compared (effect of RI change after protein layer is added)

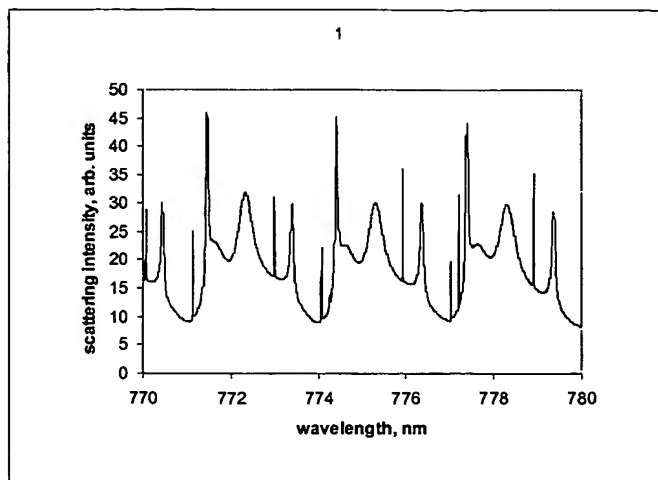


Scattering spectra for particles 3 and 4 compared (expanded scale)

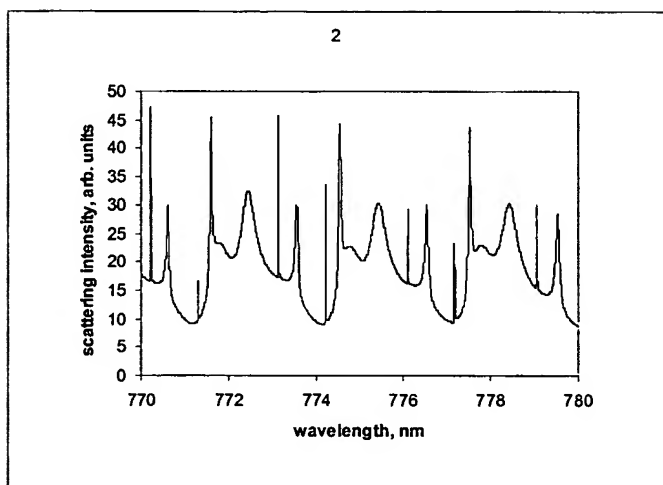
Figure 31



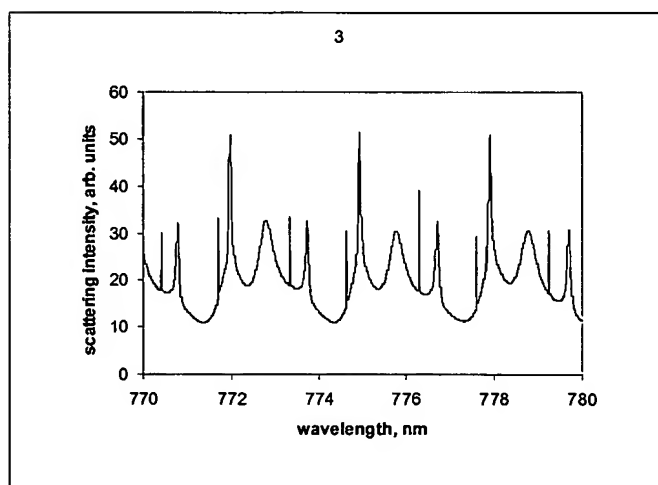
Reference particle for Example 21  
Signal amplification using refractive  
index 2.5 material



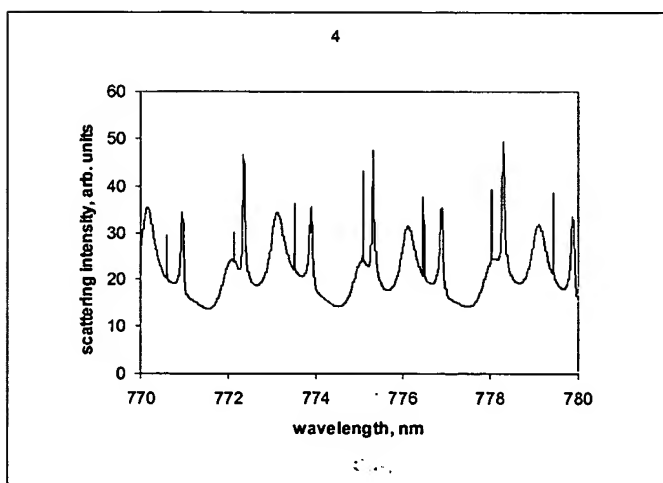
Scattering spectrum for reference particle 1



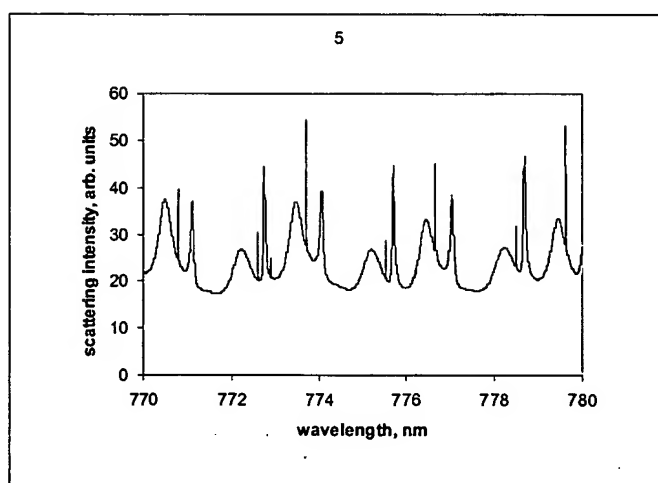
Scattering spectrum for particle 2



Scattering spectrum for particle 3



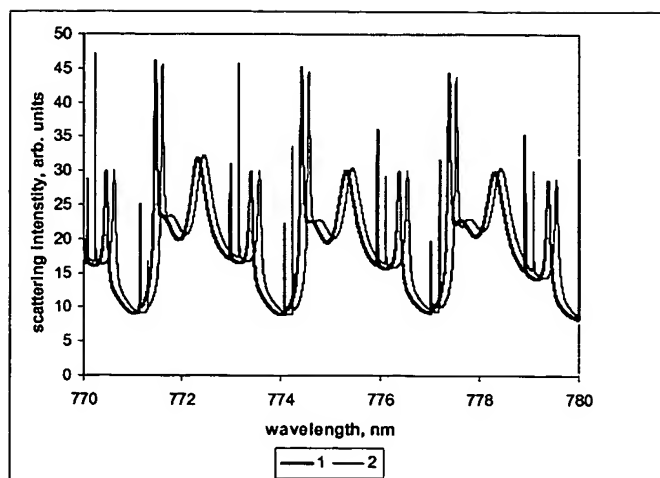
Scattering spectrum for particle 4



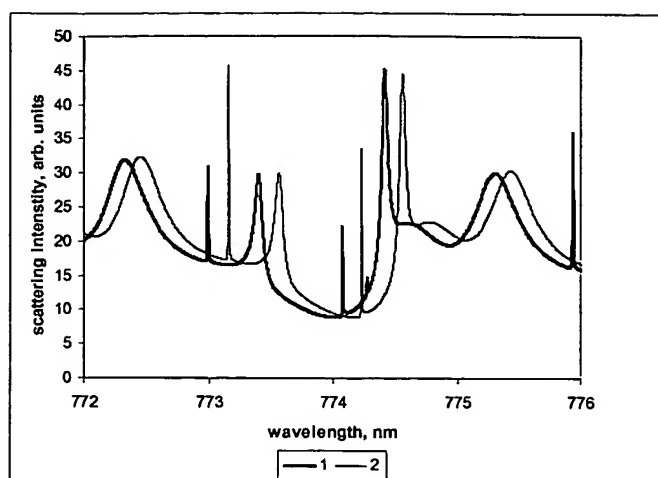
Scattering spectrum for particle 5

Figure 32

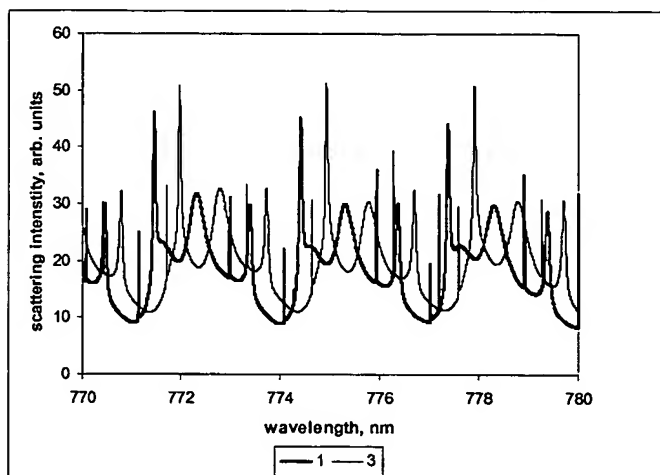




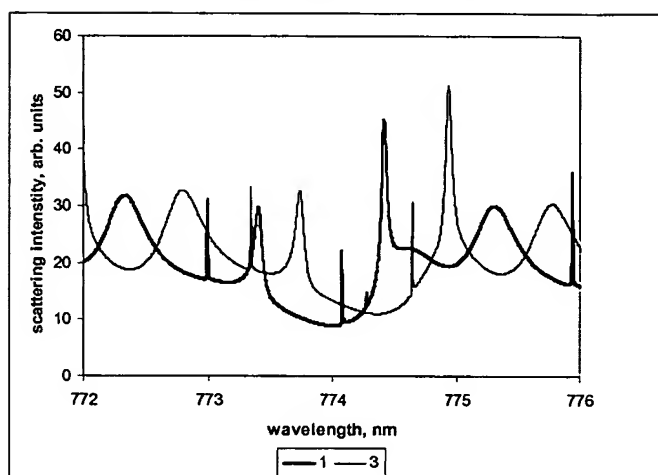
Scattering spectra for particles 1 and 2 compared (addition of protein layer)



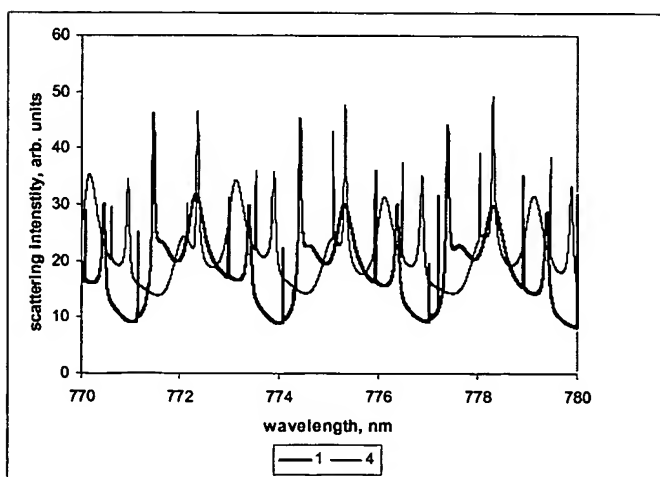
Scattering spectra for particles 1 and 2 compared (expanded scale)



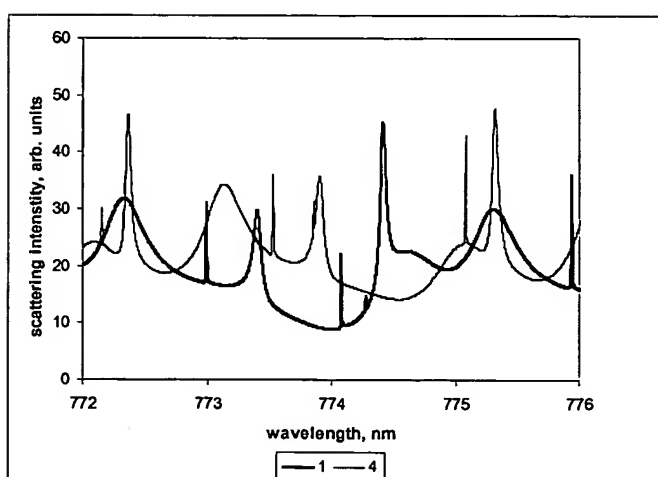
Scattering spectra for particles 1 and 3 compared (addition of protein layer with 2 nm signal amplifier)



Scattering spectra for particles 1 and 3 compared (expanded scale)

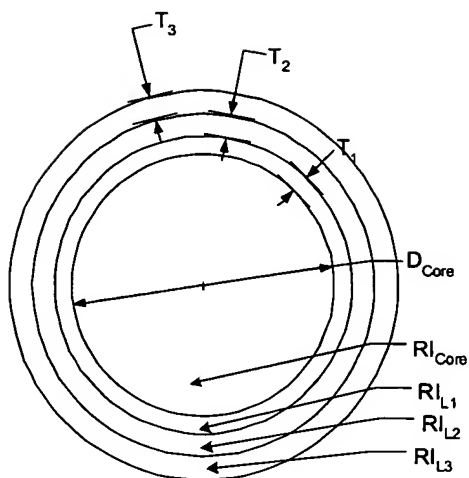


Scattering spectra for particles 1 and 4 compared (addition of protein layer with 4 nm signal amplifier)

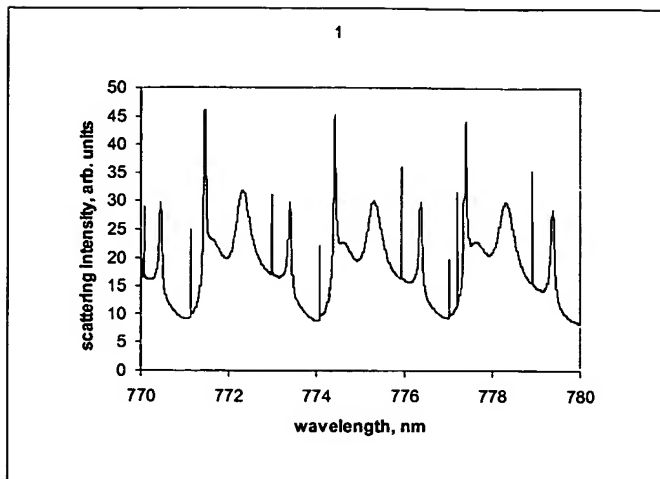


Scattering spectra for particles 1 and 4 compared (expanded scale)

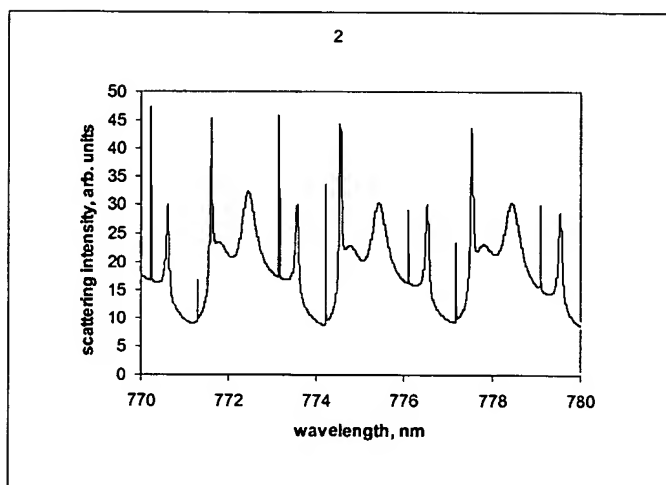
Figure 33



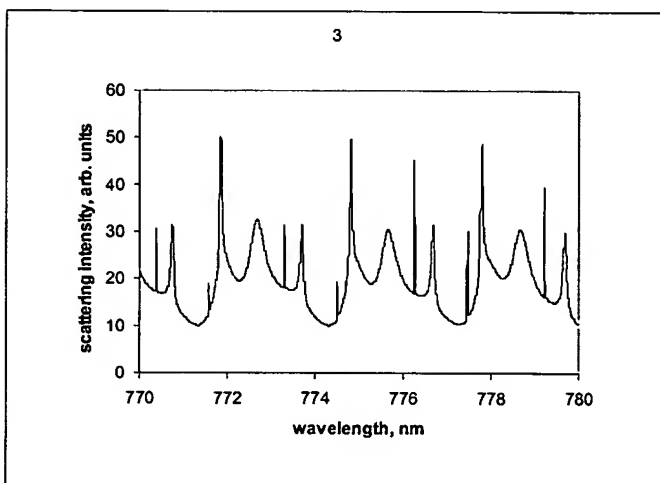
Reference particle for Example22  
Signal amplification using refractive  
index 2.2 material



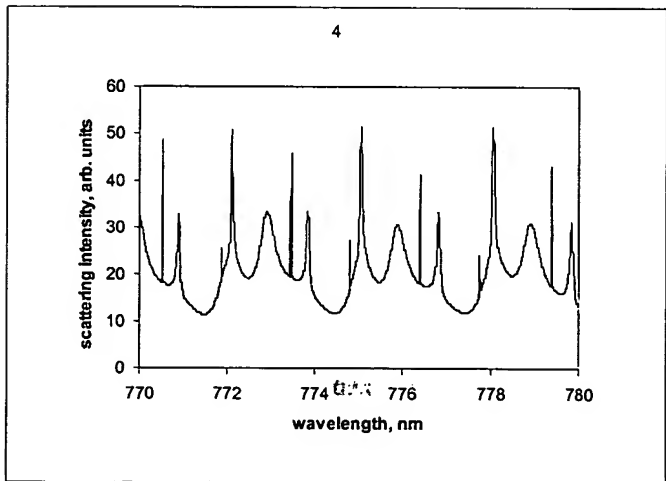
Scattering spectrum for reference particle 1



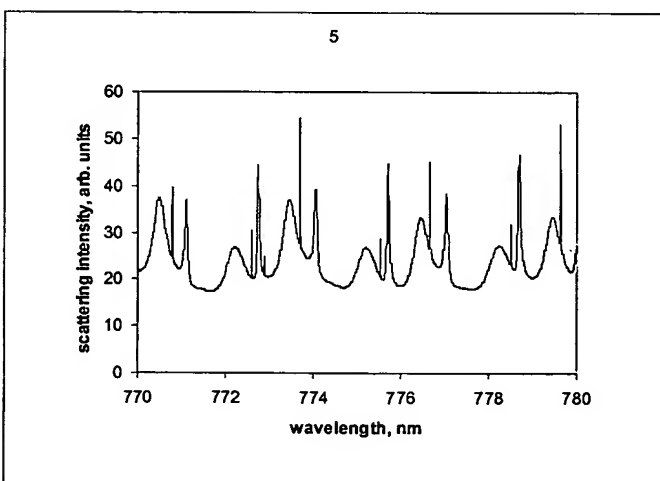
Scattering spectrum for particle 2



Scattering spectrum for particle 3

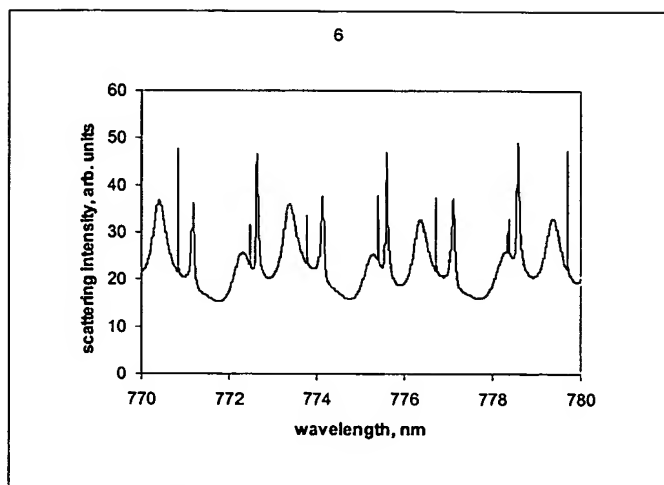


Scattering spectrum for particle 4

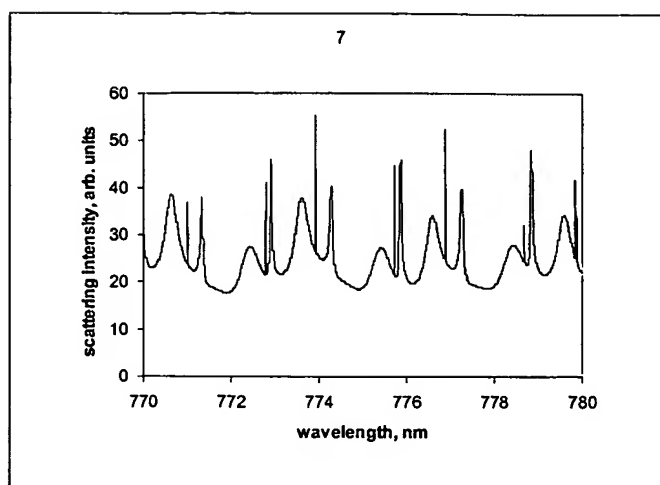


Scattering spectrum for particle 5

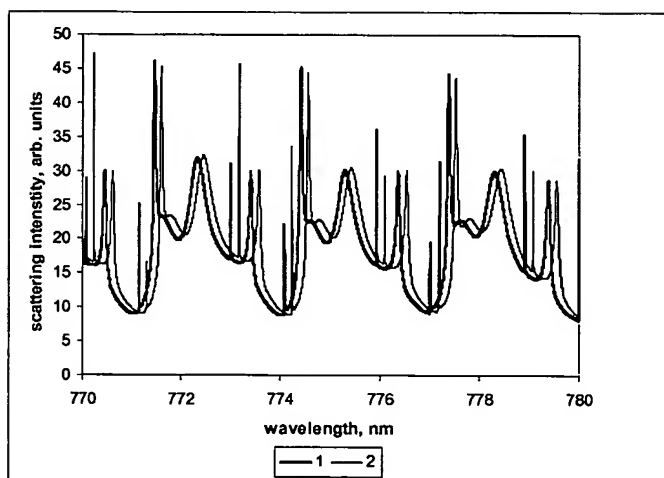
Figure 34



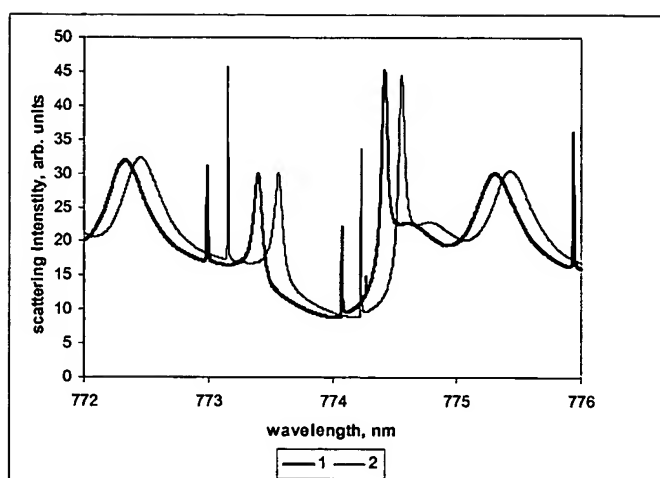
Scattering spectra for particle 6



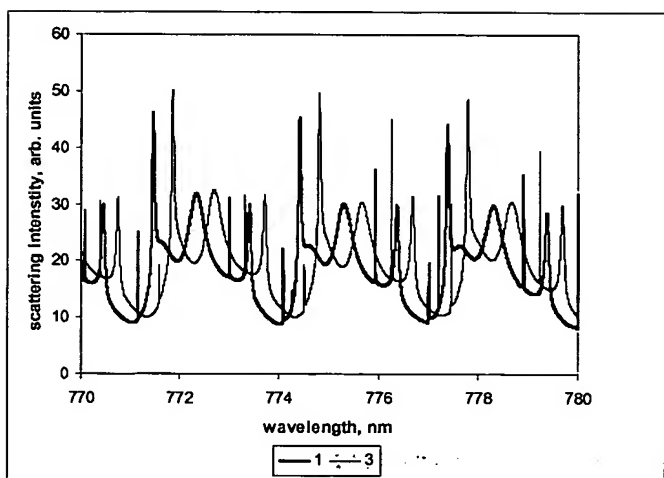
Scattering spectra for particle 7



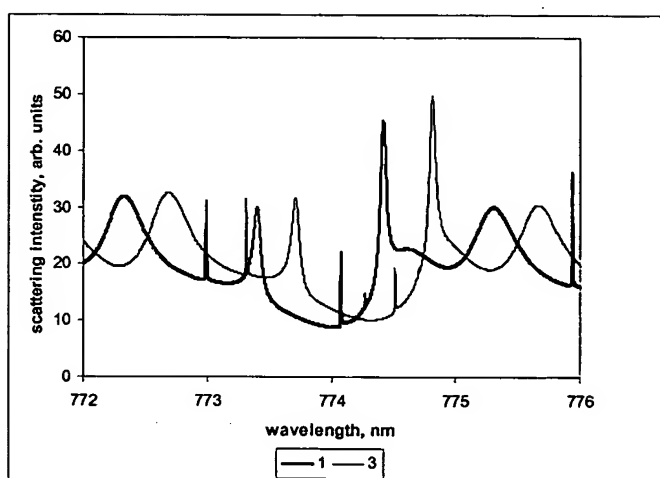
Scattering spectra for particles 1 and 2 compared  
(addition of protein layer)



Scattering spectra for particles 1 and 2 compared  
(expanded scale)

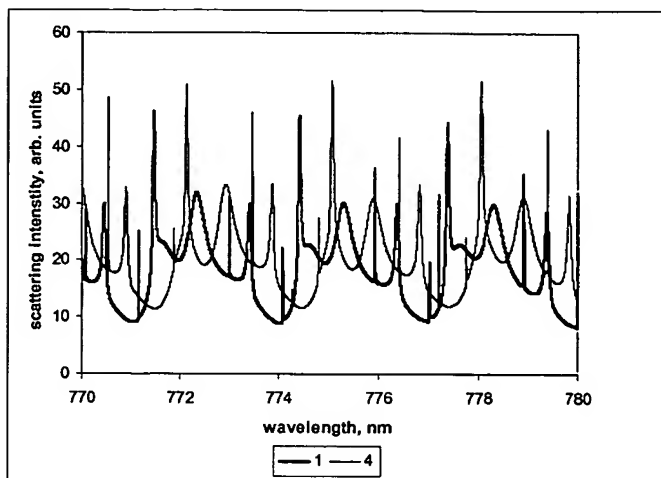


Scattering spectra for particles 1 and 3 compared  
(addition of protein layer with 2 nm signal amplifier)

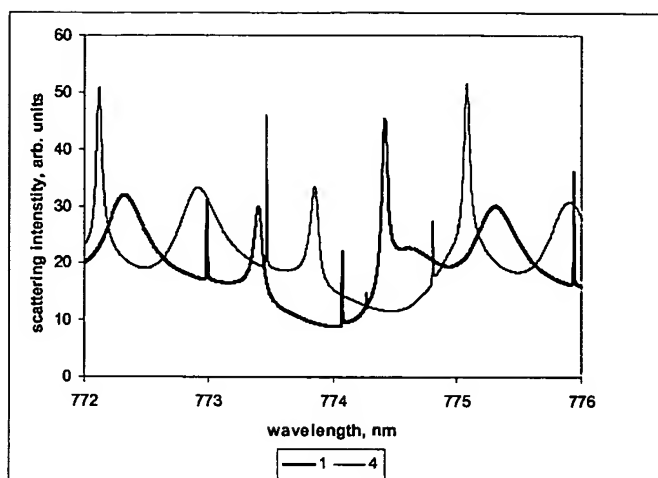


Scattering spectra for particles 1 and 3 compared  
(expanded scale)

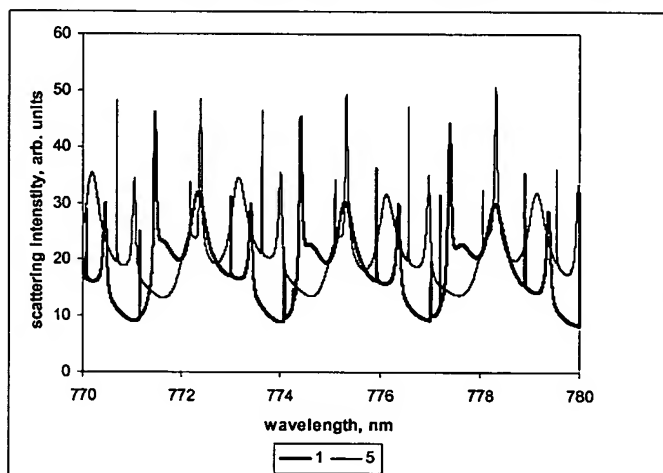
Figure 35



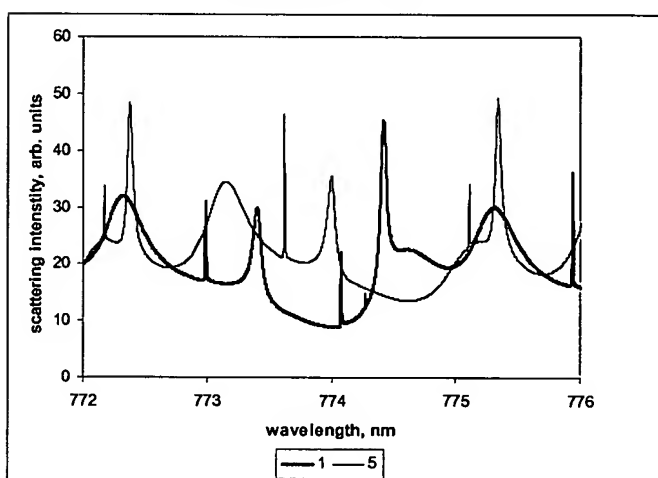
Scattering spectra for particles 1 and 4 compared  
(addition of protein layer with 4 nm signal amplifier)



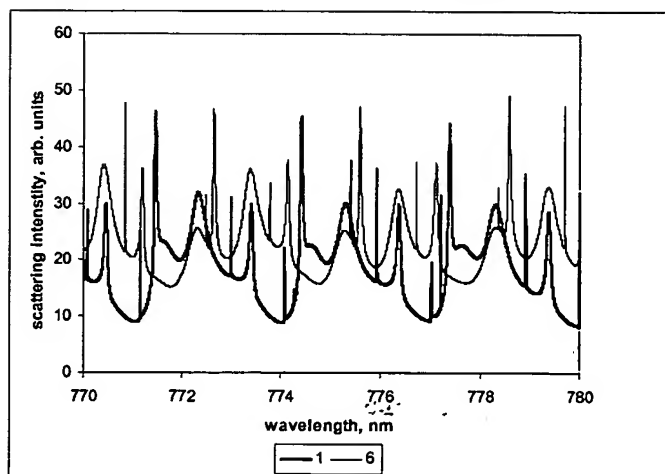
Scattering spectra for particles 1 and 4 compared  
(expanded scale)



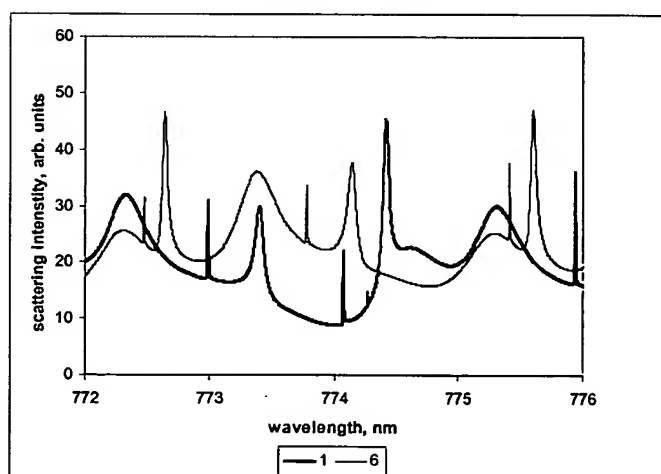
Scattering spectra for particles 1 and 5 compared  
(addition of protein layer with 6 nm signal amplifier)



Scattering spectra for particles 1 and 5 compared  
(expanded scale)

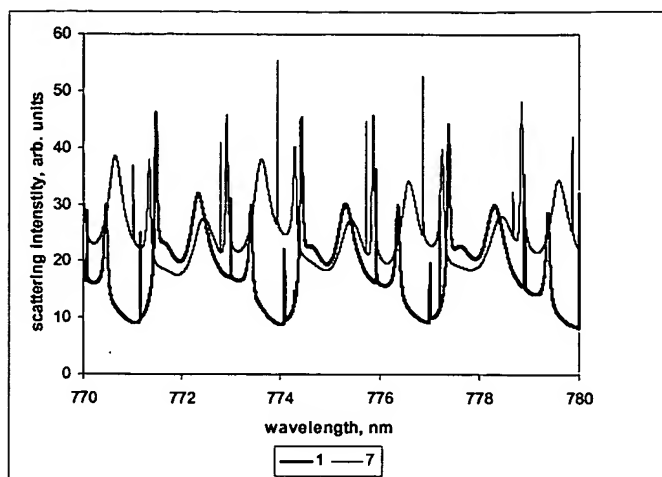


Scattering spectra for particles 1 and 6 compared  
(addition of protein layer with 8 nm signal amplifier)

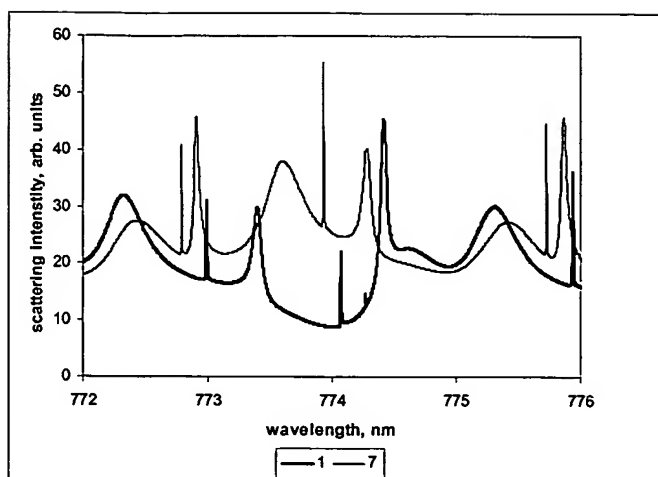


Scattering spectra for particles 1 and 6 compared  
(expanded scale)

Figure 36



Scattering spectra for particles 1 and 7 compared  
(addition of protein layer with 10 nm signal amplifier)



Scattering spectra for particles 1 and 7 compared  
(expanded scale)

Figure 37